

(10) **Patent No.:** US 9,134,331 B2
(45) **Date of Patent:** Sep. 15, 2015

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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1366 days.

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- (22) Filed: **Mar. 6, 2009**

- * cited by examiner

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- (74) *Attorney, Agent, or Firm* — Brinks Gilson & Lione

- (30) **Foreign Application Priority Data**

Mar. 7, 2008 (JP) 2008-057972

- (57)
- ABSTRACT**

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G01N 35/02 (2006.01)
G01N 35/00 (2006.01)
- (52) **U.S. Cl.**
 CPC ... *G01N 35/0092* (2013.01); *Y10T 436/114165*
 (2015.01)

- (52) **U.S. Cl.**
CPC ... **G01N 35/0092** (2013.01); **Y10T 436/114165**
(2015.01)

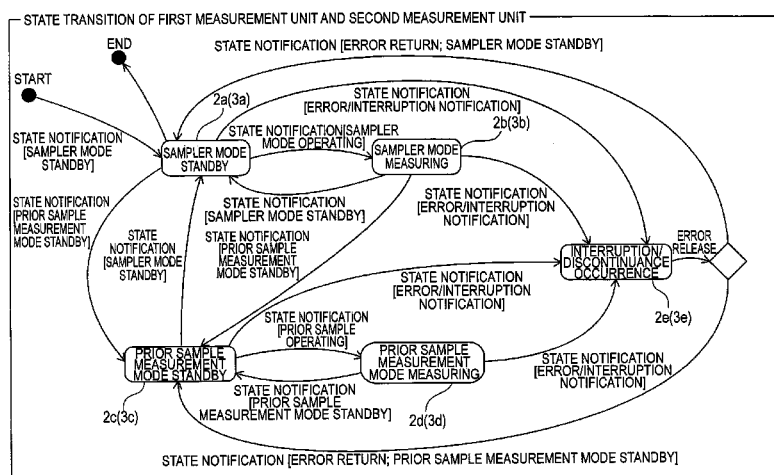
- (58) **Field of Classification Search**
CPC G01N 35/0092
USPC 422/50, 63, 67, 105, 116; 436/43, 50,
436/55; 700/266, 302, 11, 12
See application file for complete search history.

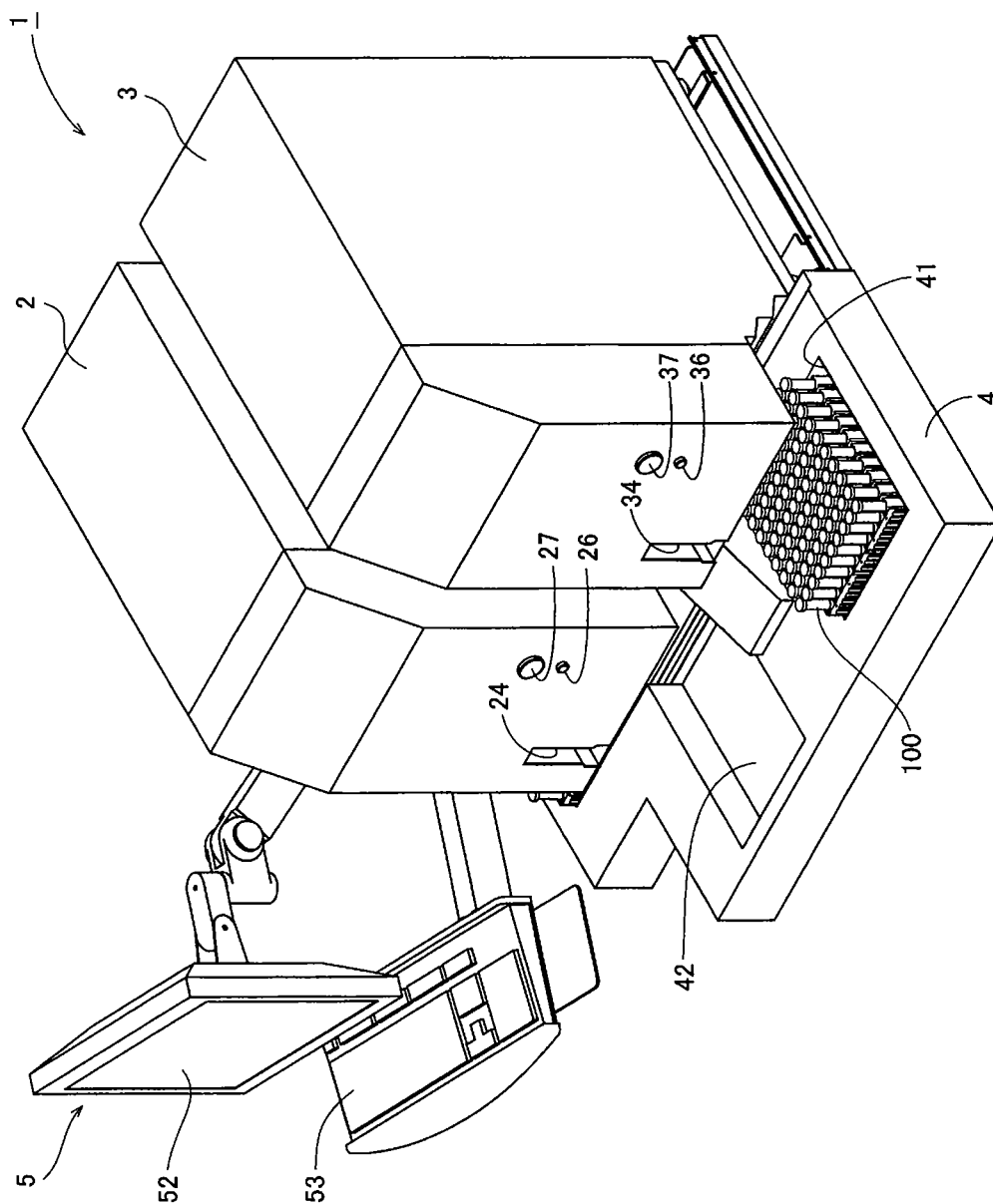
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17 Claims, 23 Drawing Sheets





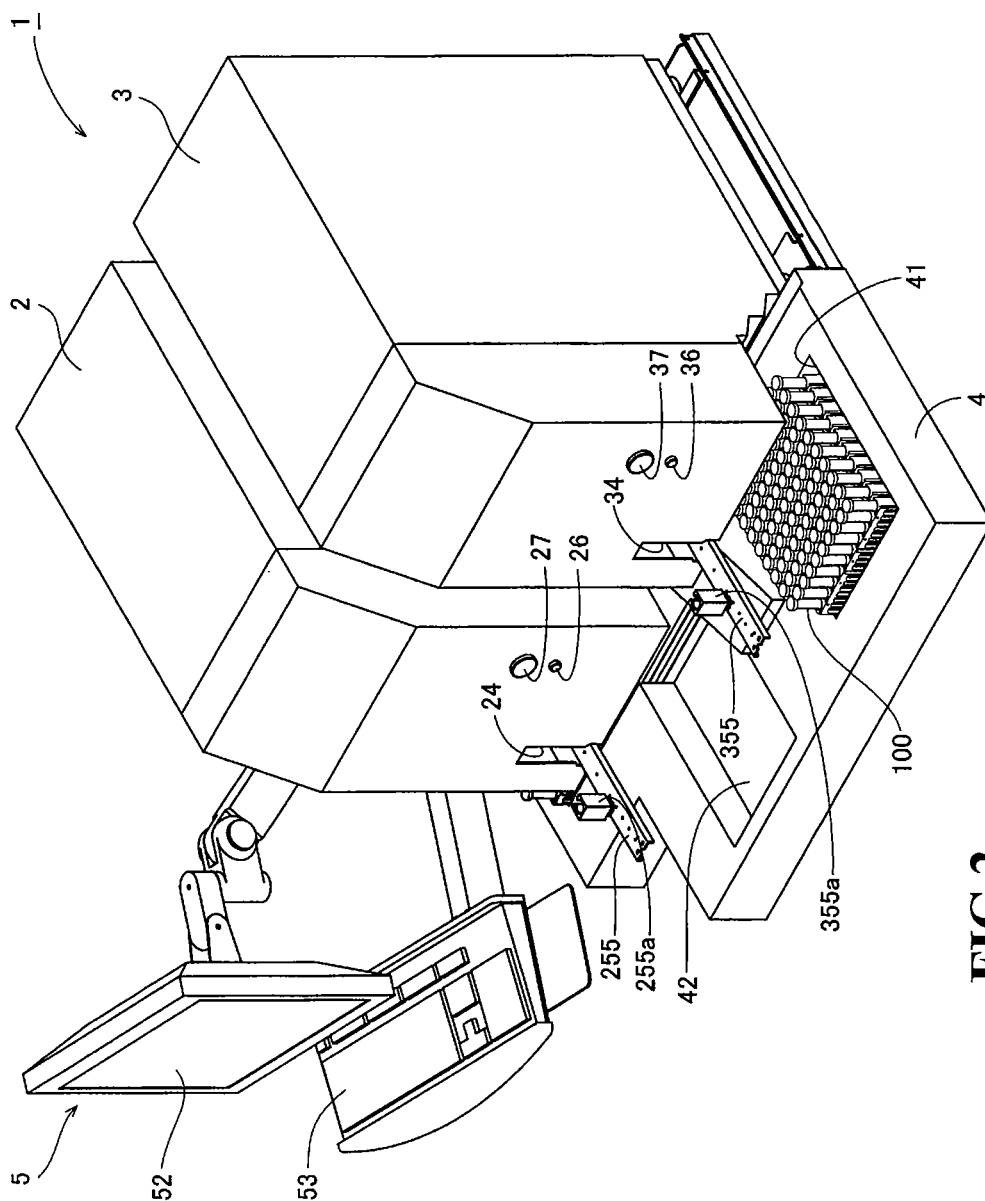
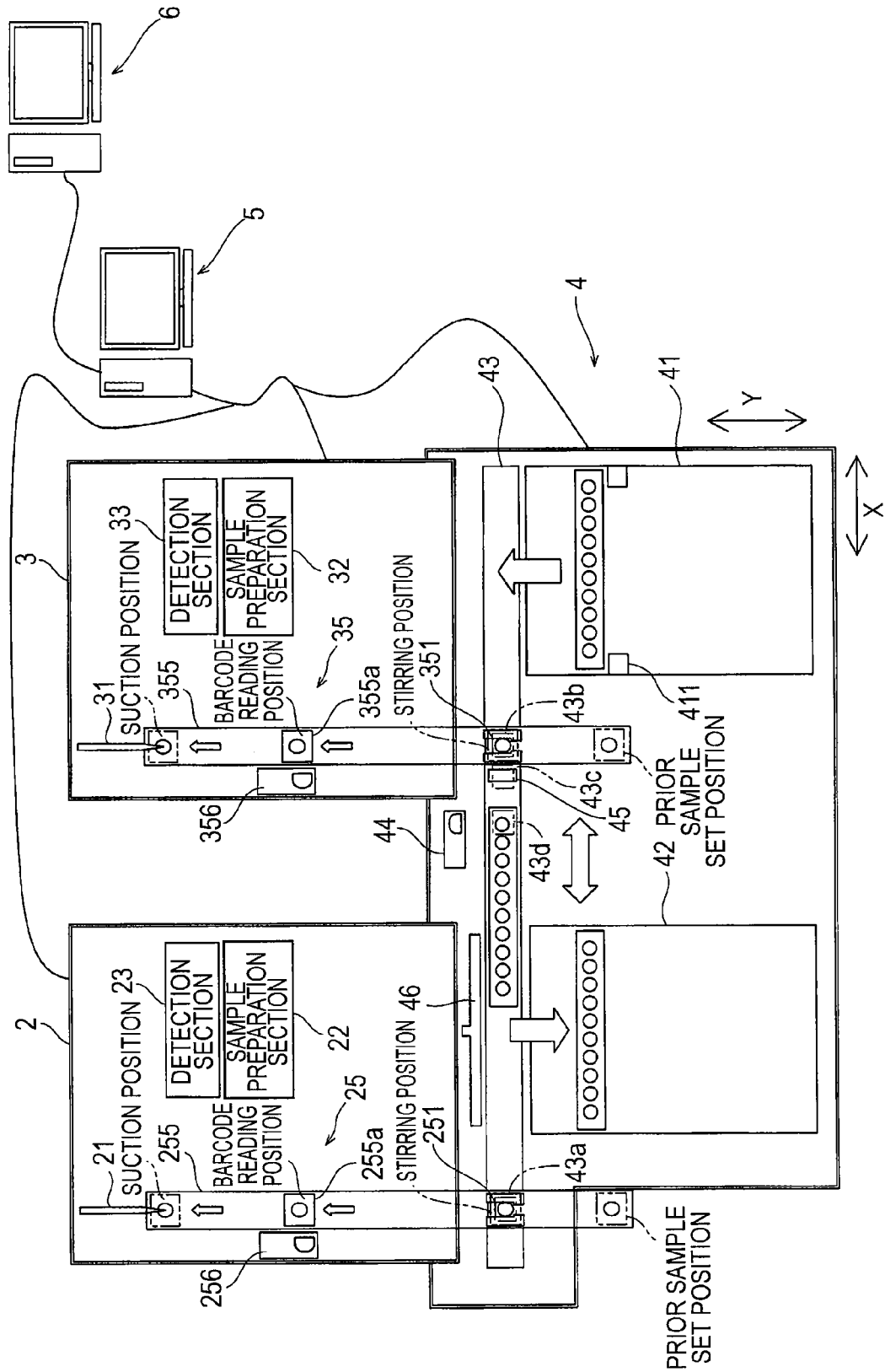


FIG.2

FIG. 3



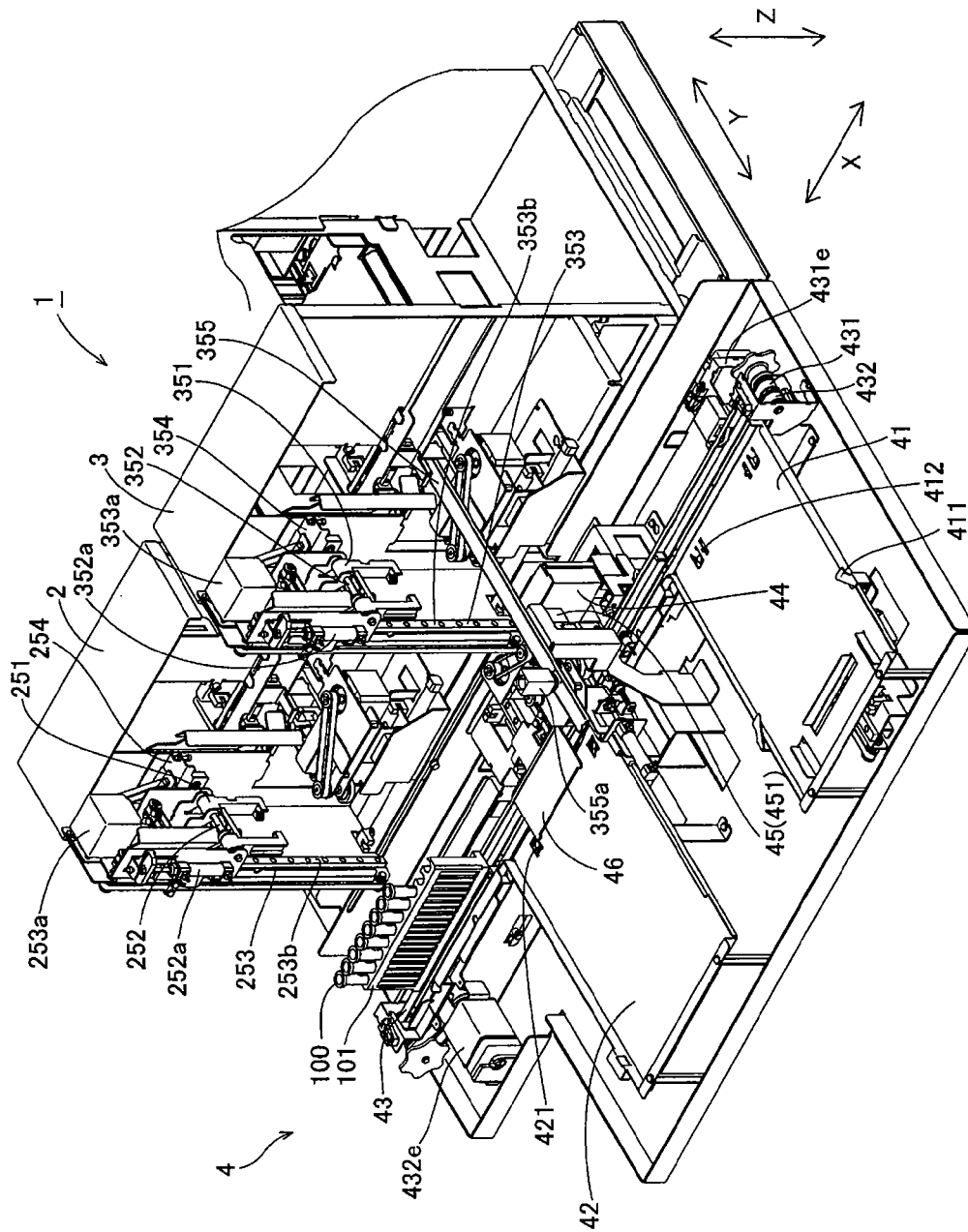


FIG. 4

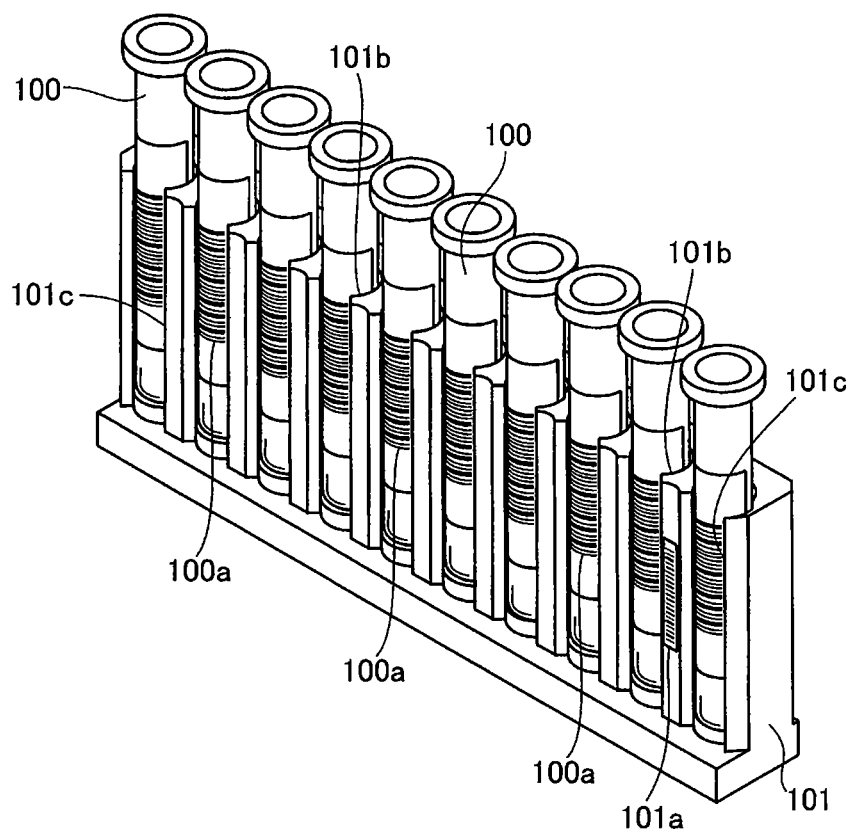


FIG.5

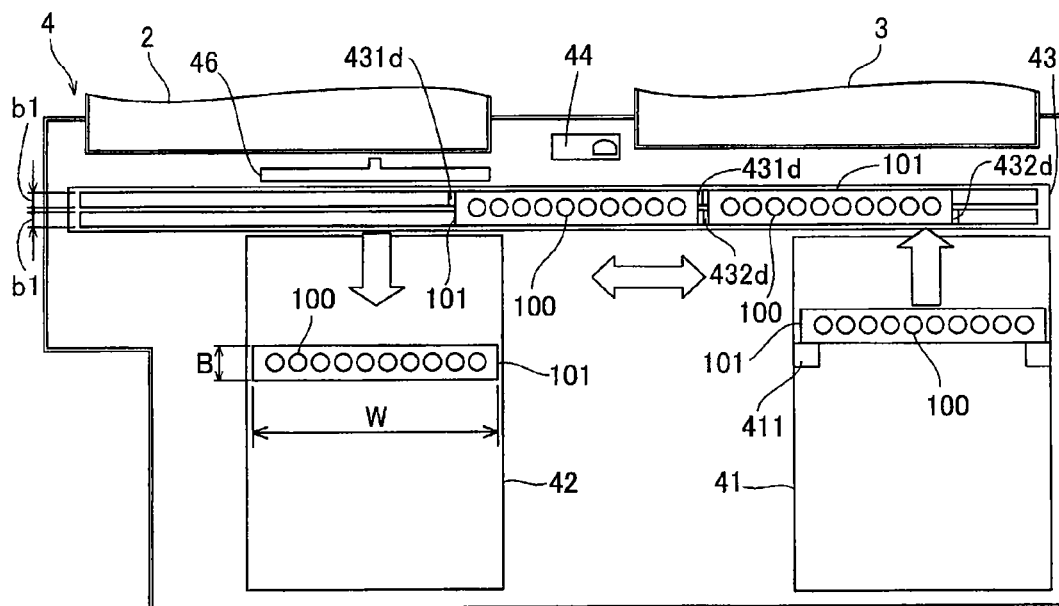


FIG.6

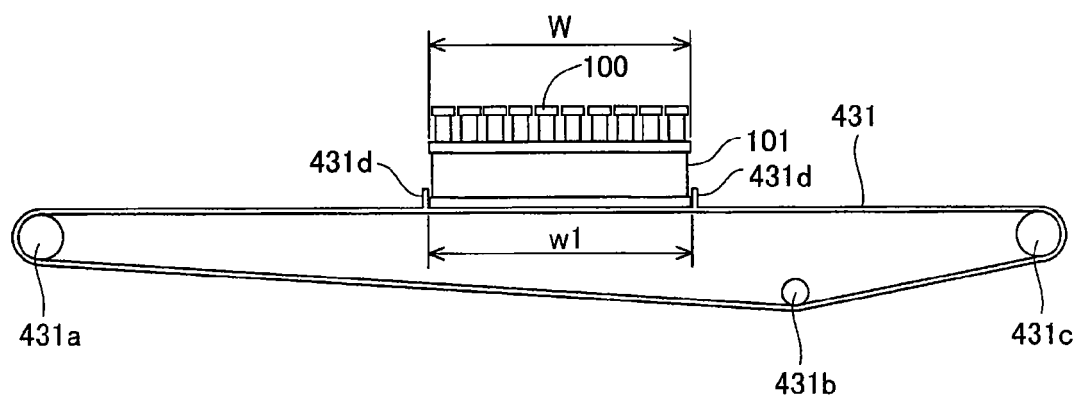


FIG. 7

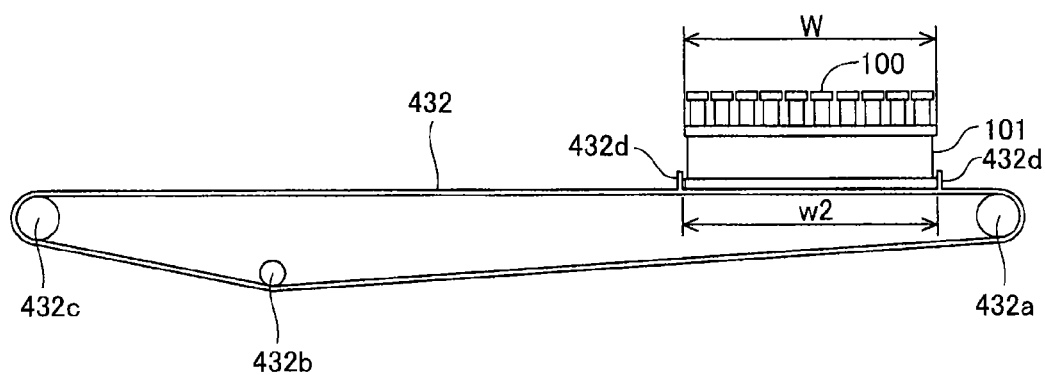


FIG. 8

FIG. 9

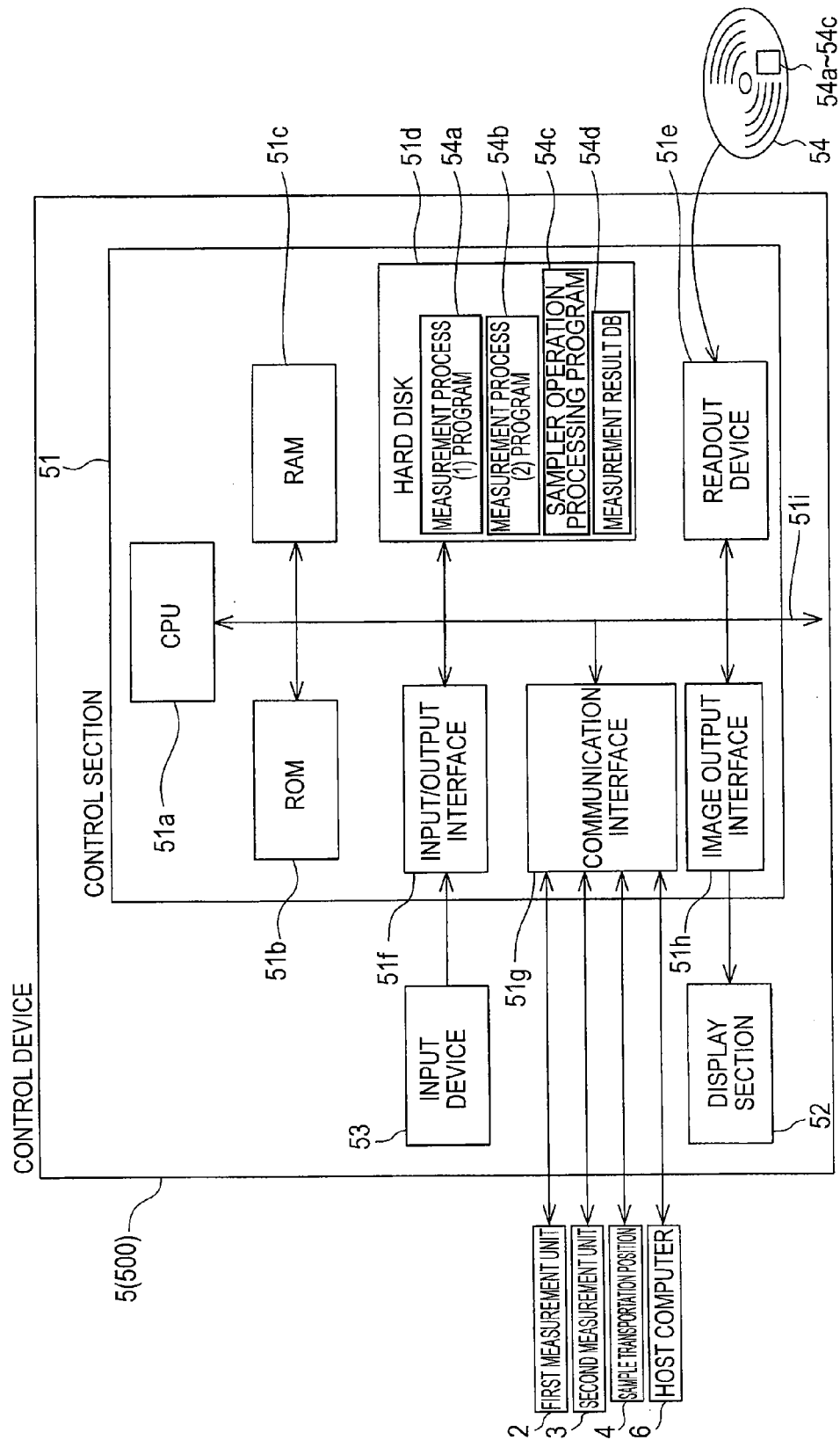


FIG. 10

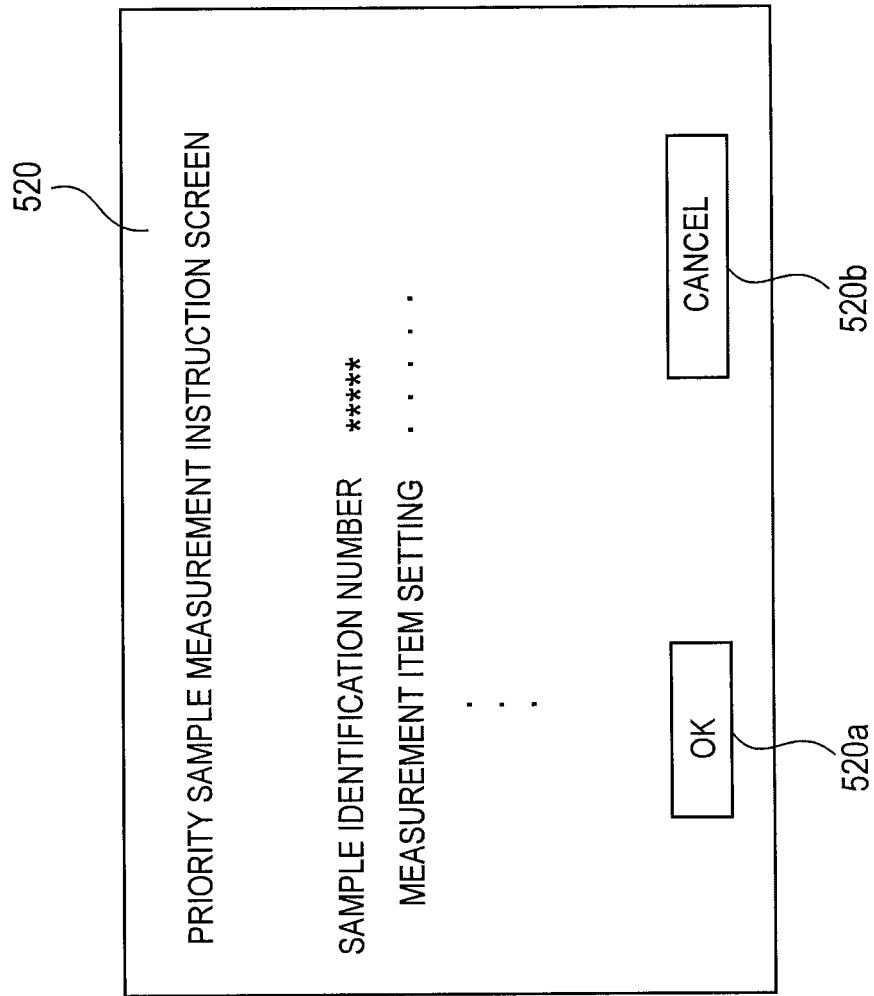


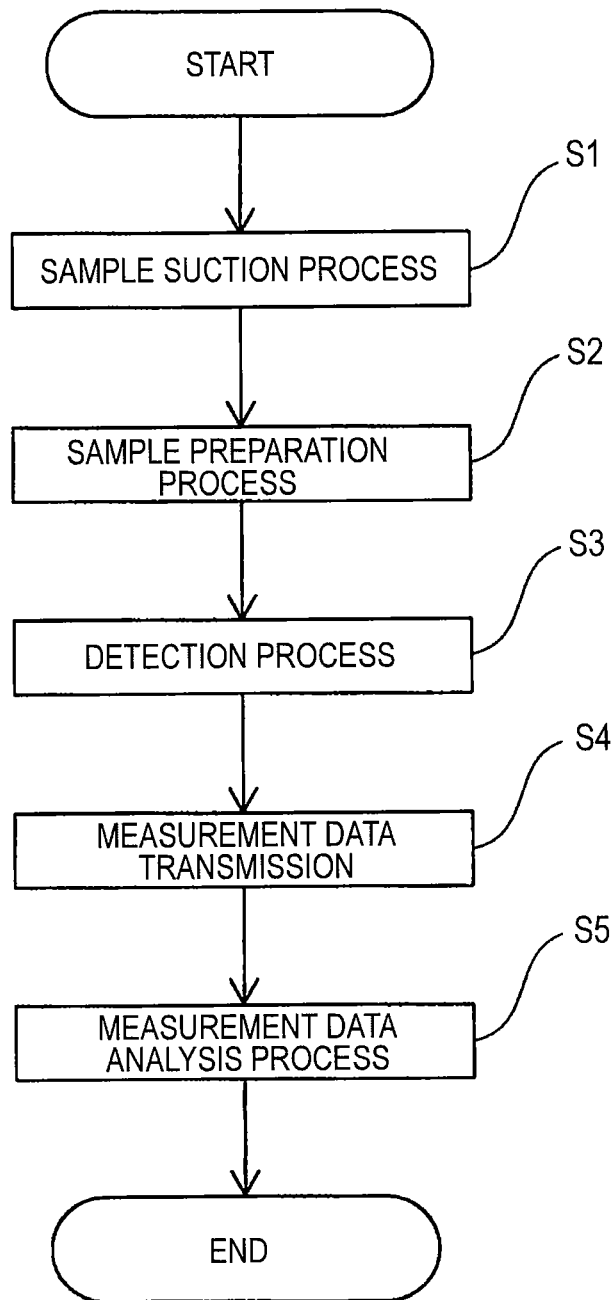
FIG. 11

FIG. 12

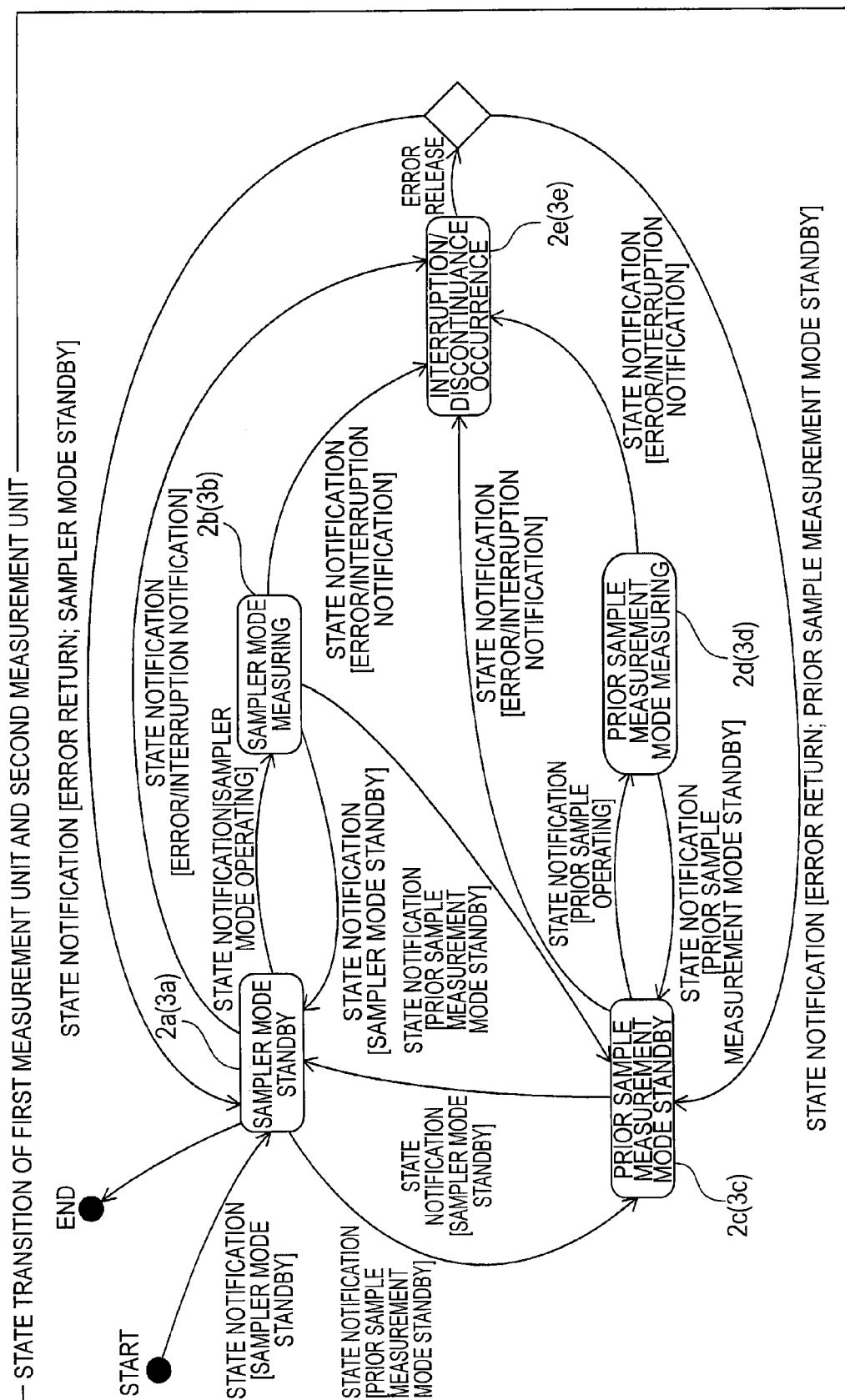


FIG. 13

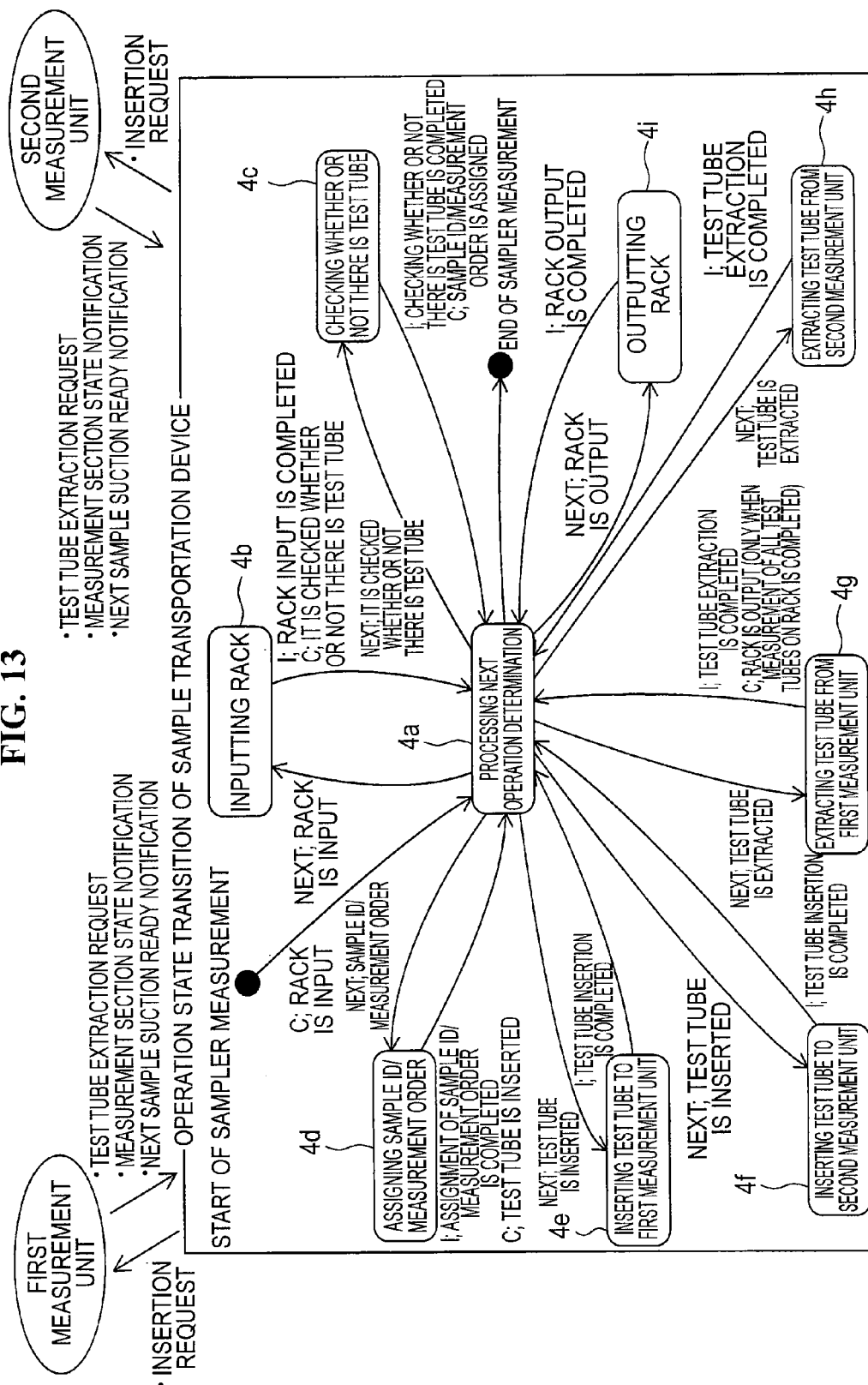


FIG. 14

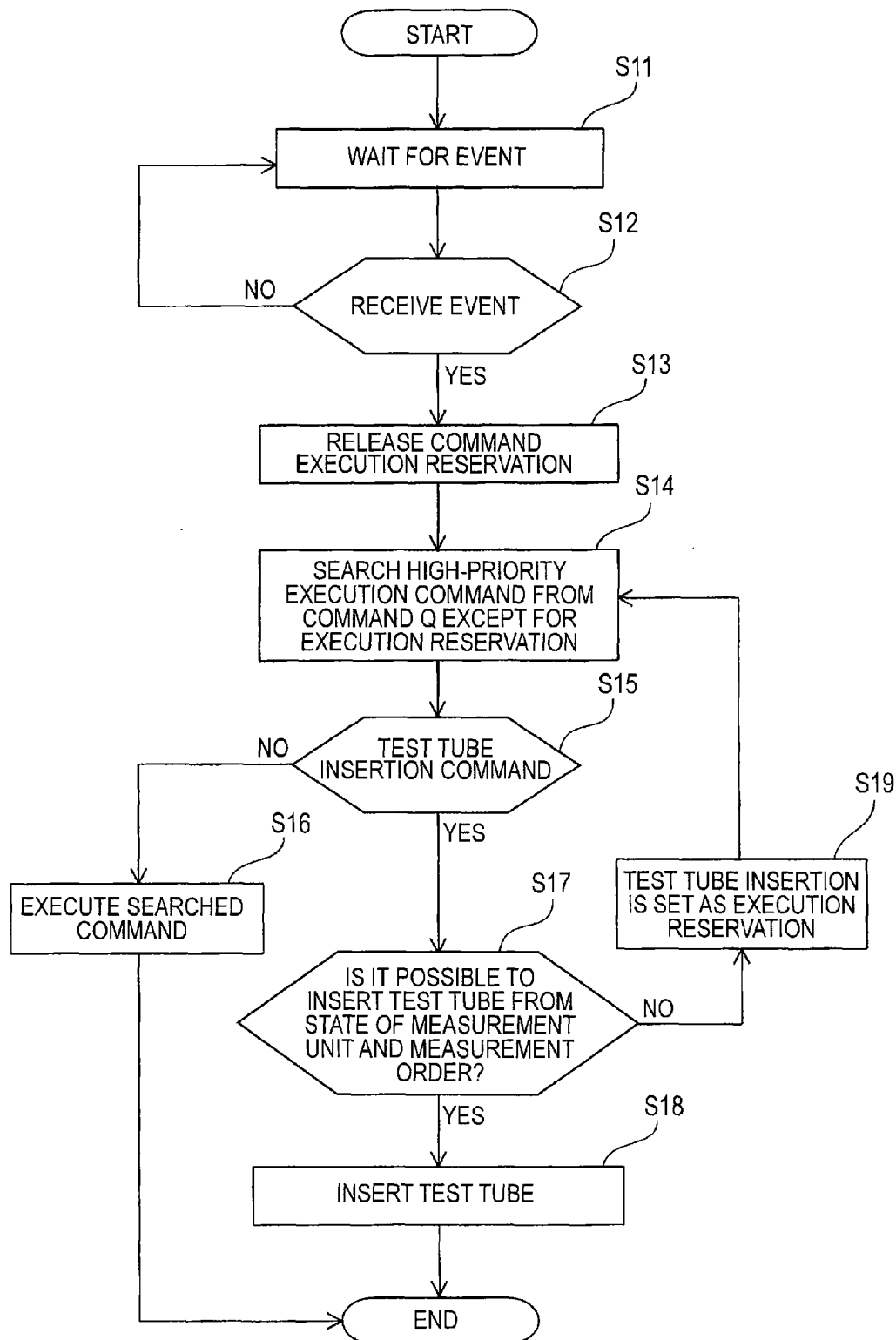


FIG. 15

EVENT LIST

RACK INPUT COMPLETION
RACK OUTPUT COMPLETION
TEST TUBE PRESENCE CHECK COMPLETION
SAMPLE ID/MEASUREMENT ORDER ASSIGNMENT COMPLETION
TEST TUBE INSERTION COMPLETION TO FIRST MEASUREMENT UNIT
TEST TUBE INSERTION COMPLETION TO SECOND MEASUREMENT UNIT
TEST TUBE EXTRACTION COMPLETION FROM FIRST MEASUREMENT UNIT
TEST TUBE EXTRACTION COMPLETION FROM SECOND MEASUREMENT UNIT
TEST TUBE EXTRACTION REQUEST
MEASUREMENT UNIT STATE NOTIFICATION
NEXT SAMPLE SUCTION READY NOTIFICATION

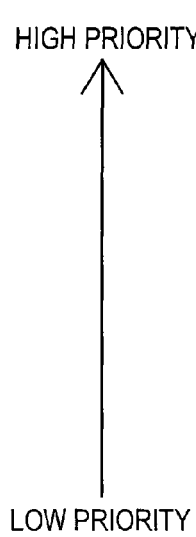
FIG. 16

Diagram illustrating the priority of commands, showing a vertical arrow pointing upwards from 'LOW PRIORITY' to 'HIGH PRIORITY'.

PRIORITY OF COMMAND	
1	OUTPUT RACK
2	INPUT RACK
3	EXTRACT TEST TUBE FROM FIRST MEASUREMENT UNIT
4	EXTRACT TEST TUBE FROM SECOND MEASUREMENT UNIT
5	INSERT TEST TUBE TO FIRST MEASUREMENT UNIT
6	INSERT TEST TUBE TO SECOND MEASUREMENT UNIT
7	CHECK WHETHER OR NOT THERE IS TEST TUBE
8	ASSIGN SAMPLE ID/MEASUREMENT ORDER

FIG. 17

OPERATION AT THE TIME OF PRIOR SAMPLE MEASUREMENT (FIRST EMBODIMENT)

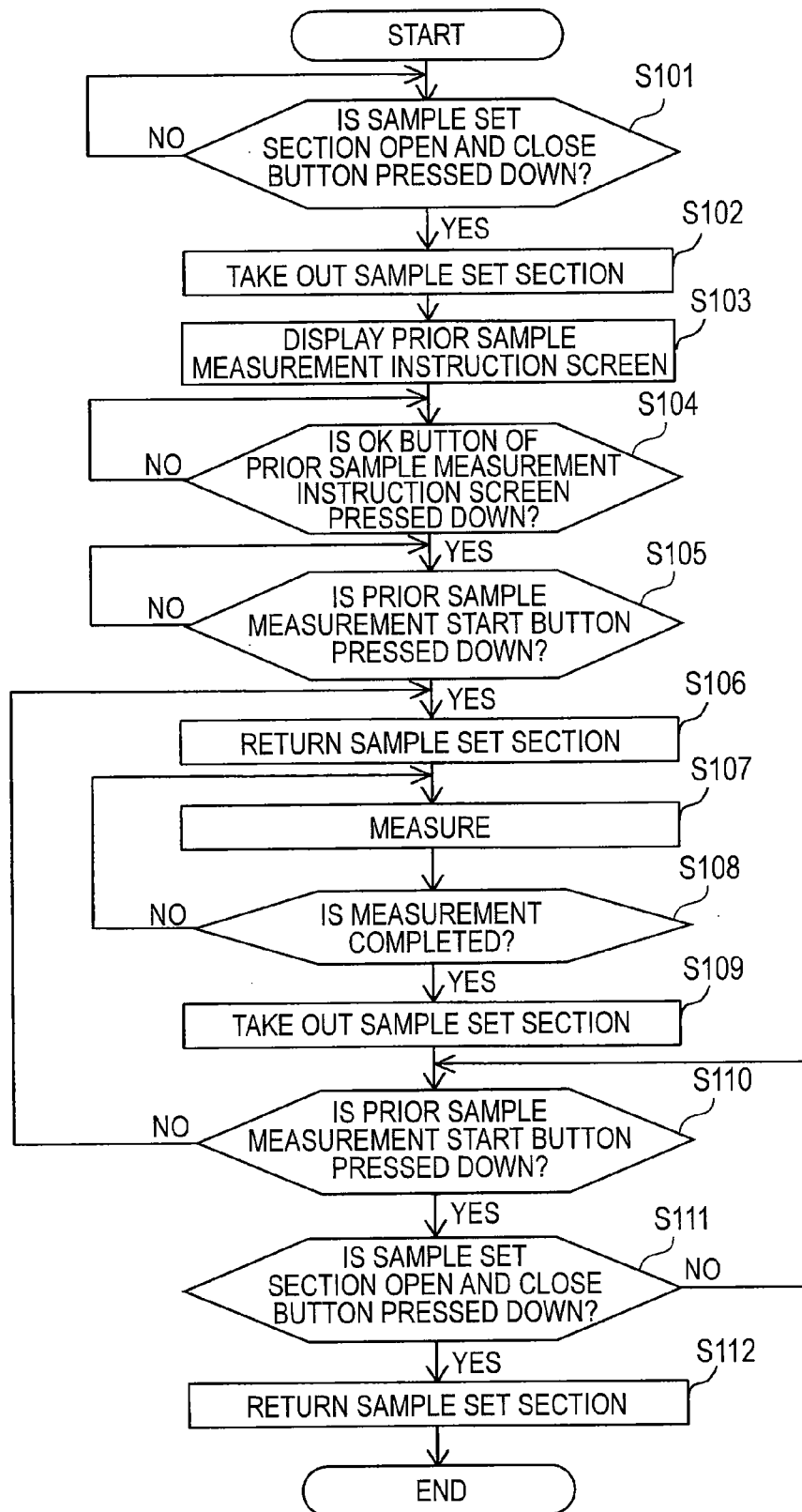
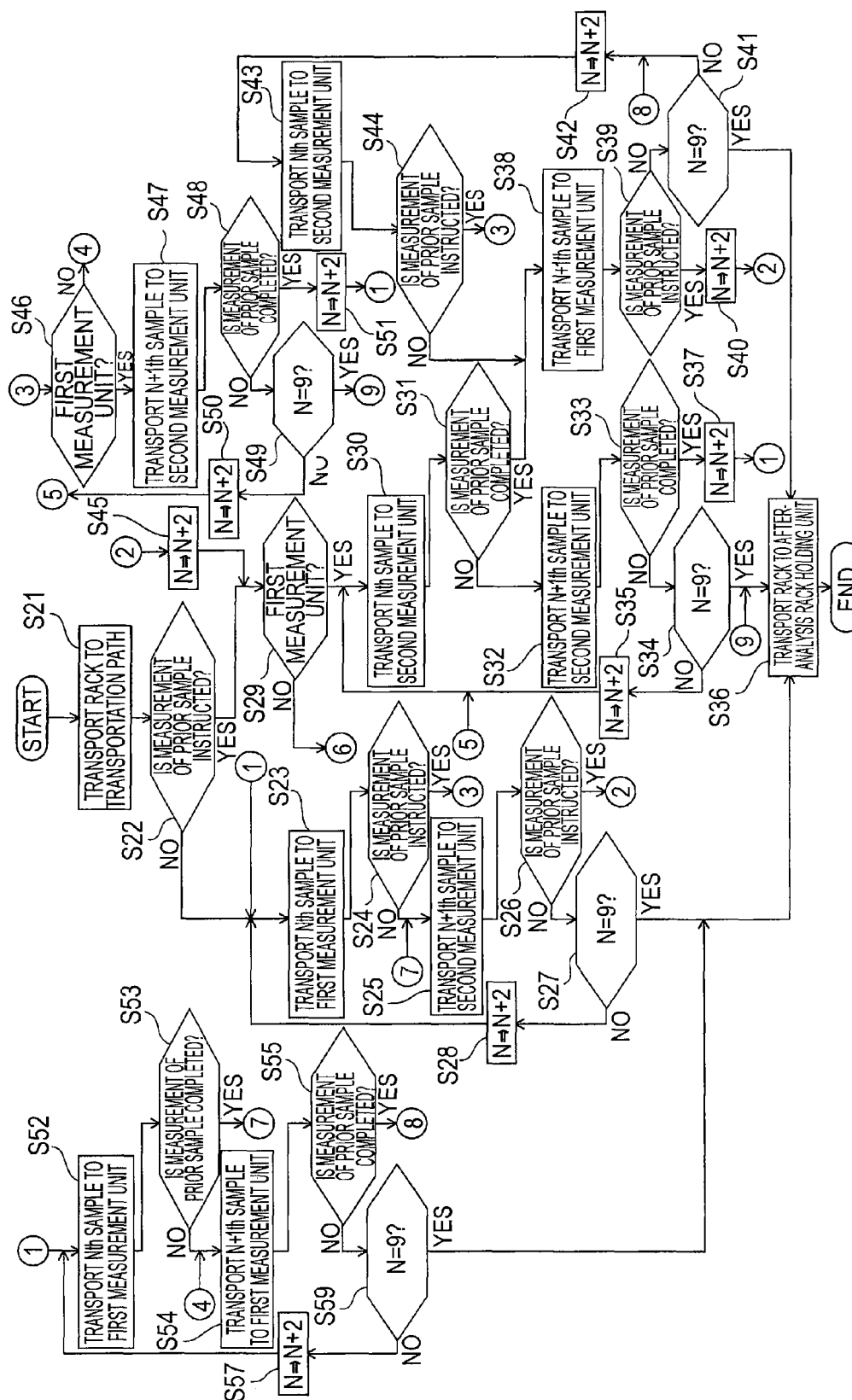


FIG. 18



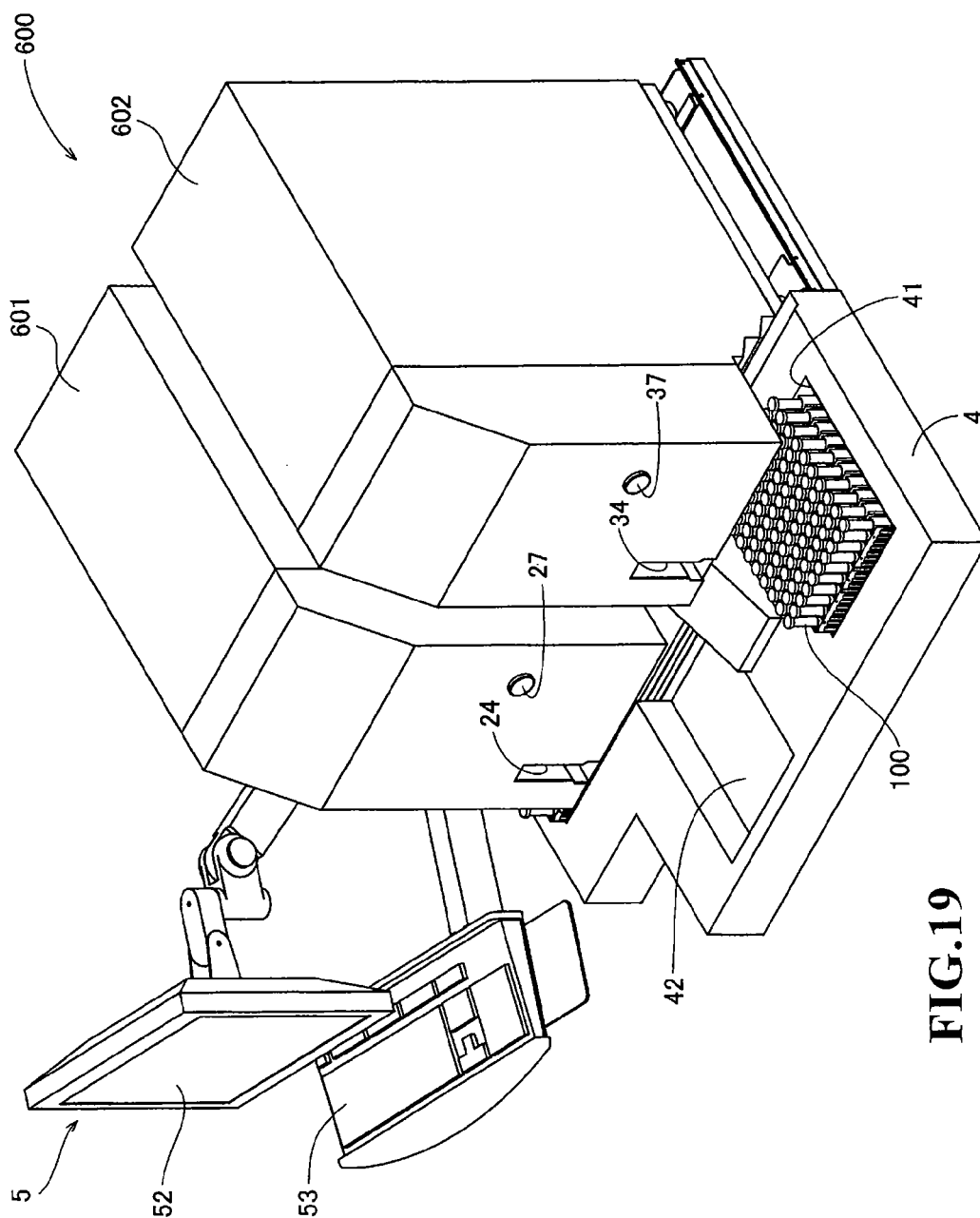
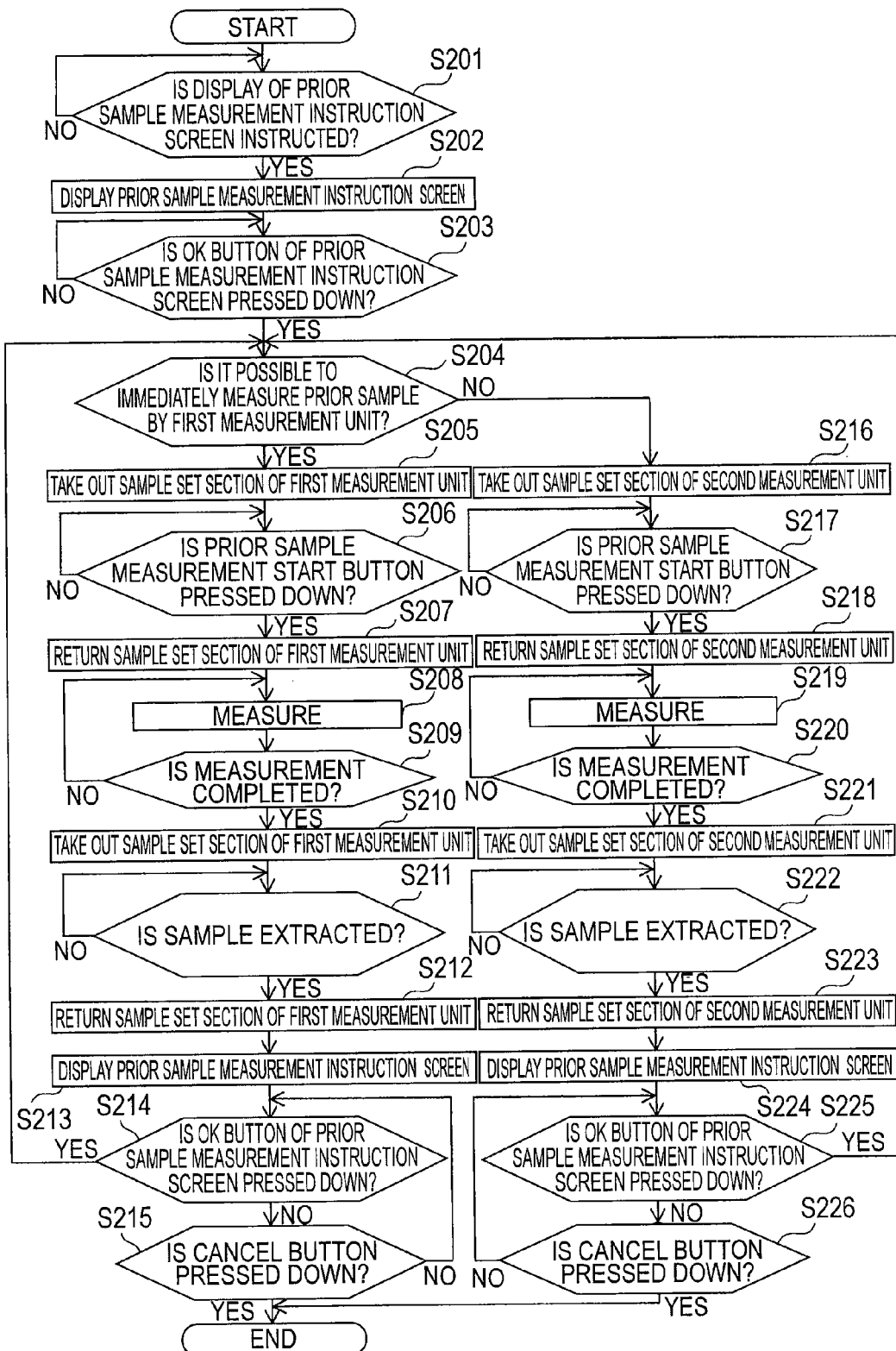


FIG.19

FIG. 20

OPERATION AT THE TIME OF PRIOR SAMPLE MEASUREMENT (SECOND EMBODIMENT)



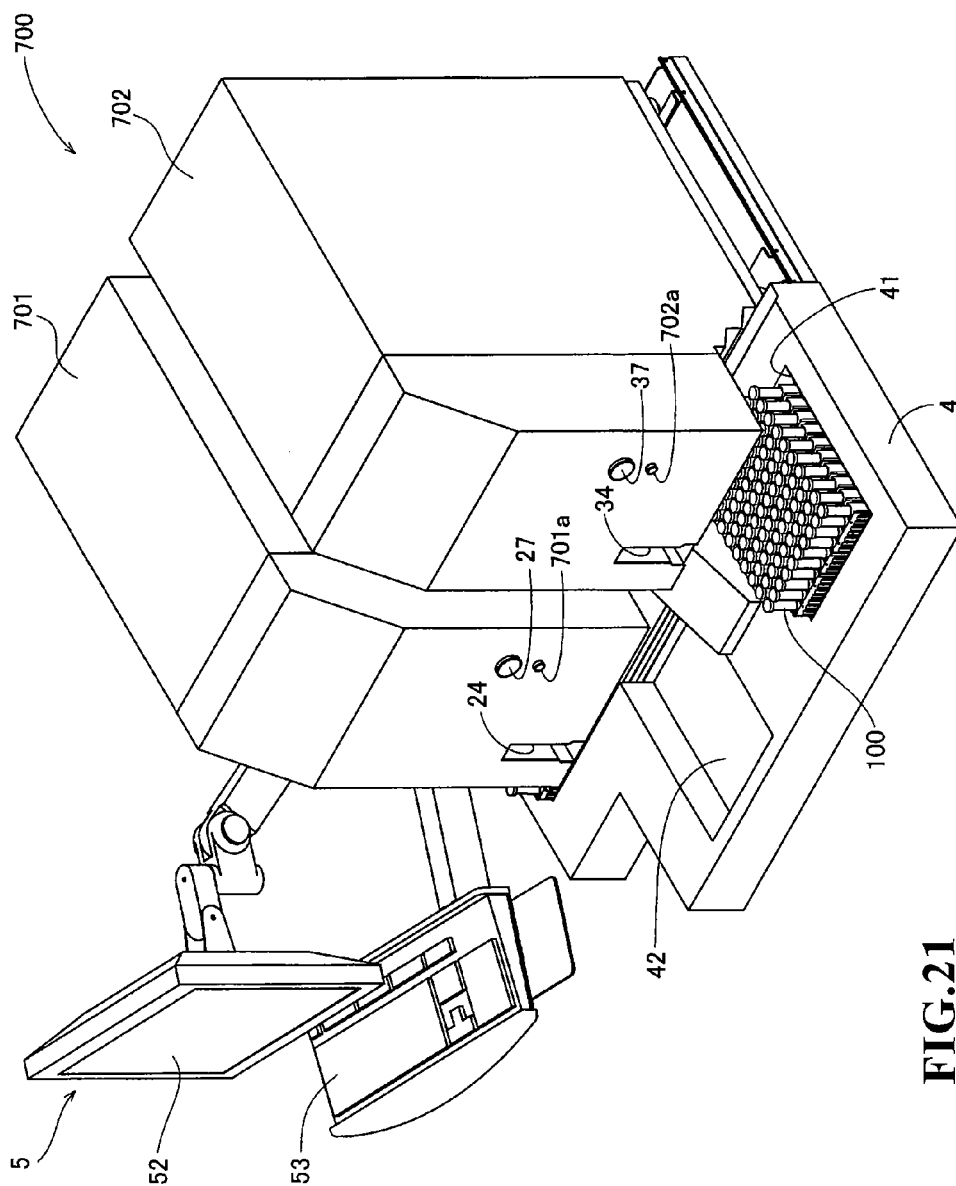
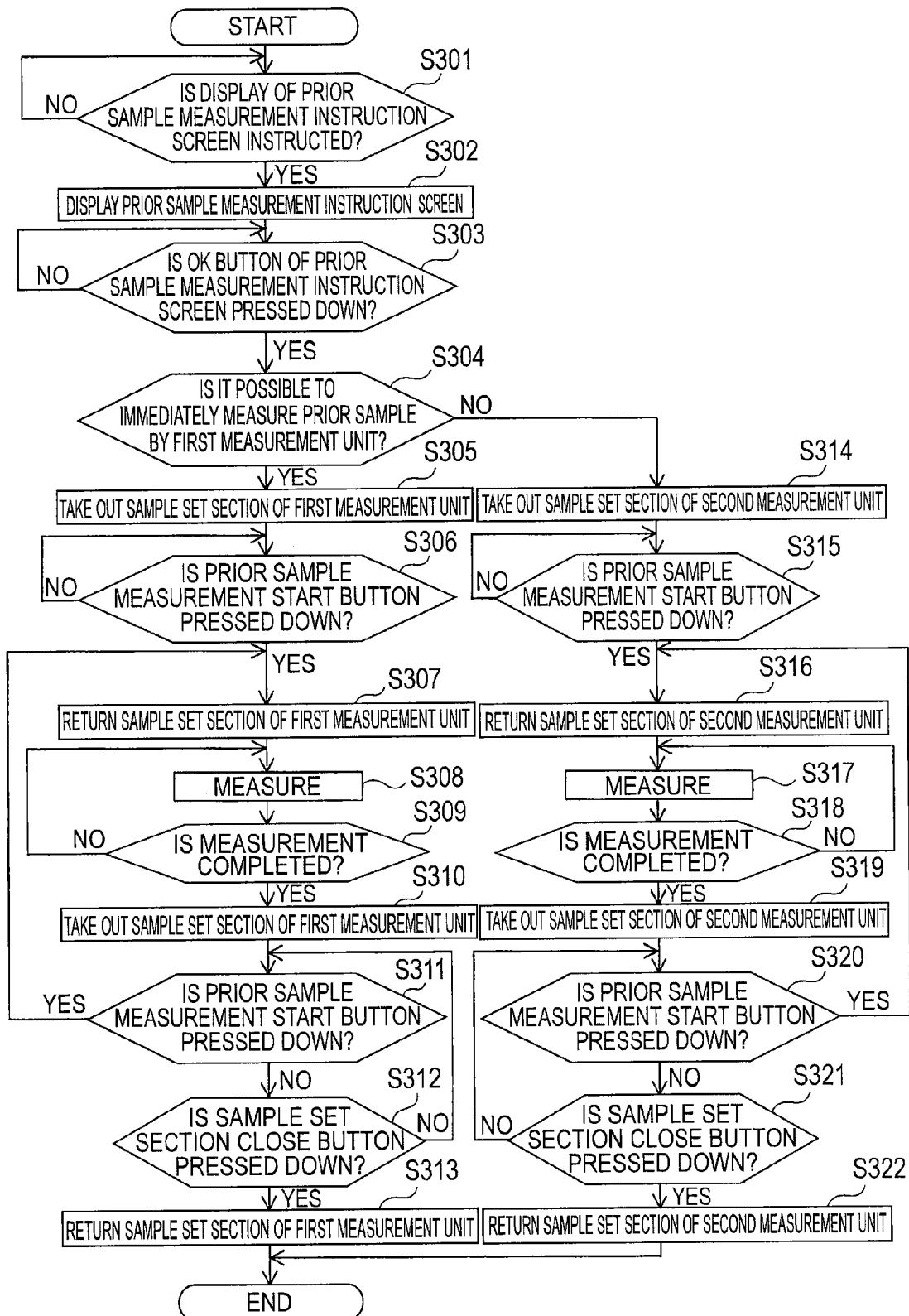


FIG. 21

FIG. 22

OPERATION AT THE TIME OF PRIOR SAMPLE MEASUREMENT (THIRD EMBODIMENT)



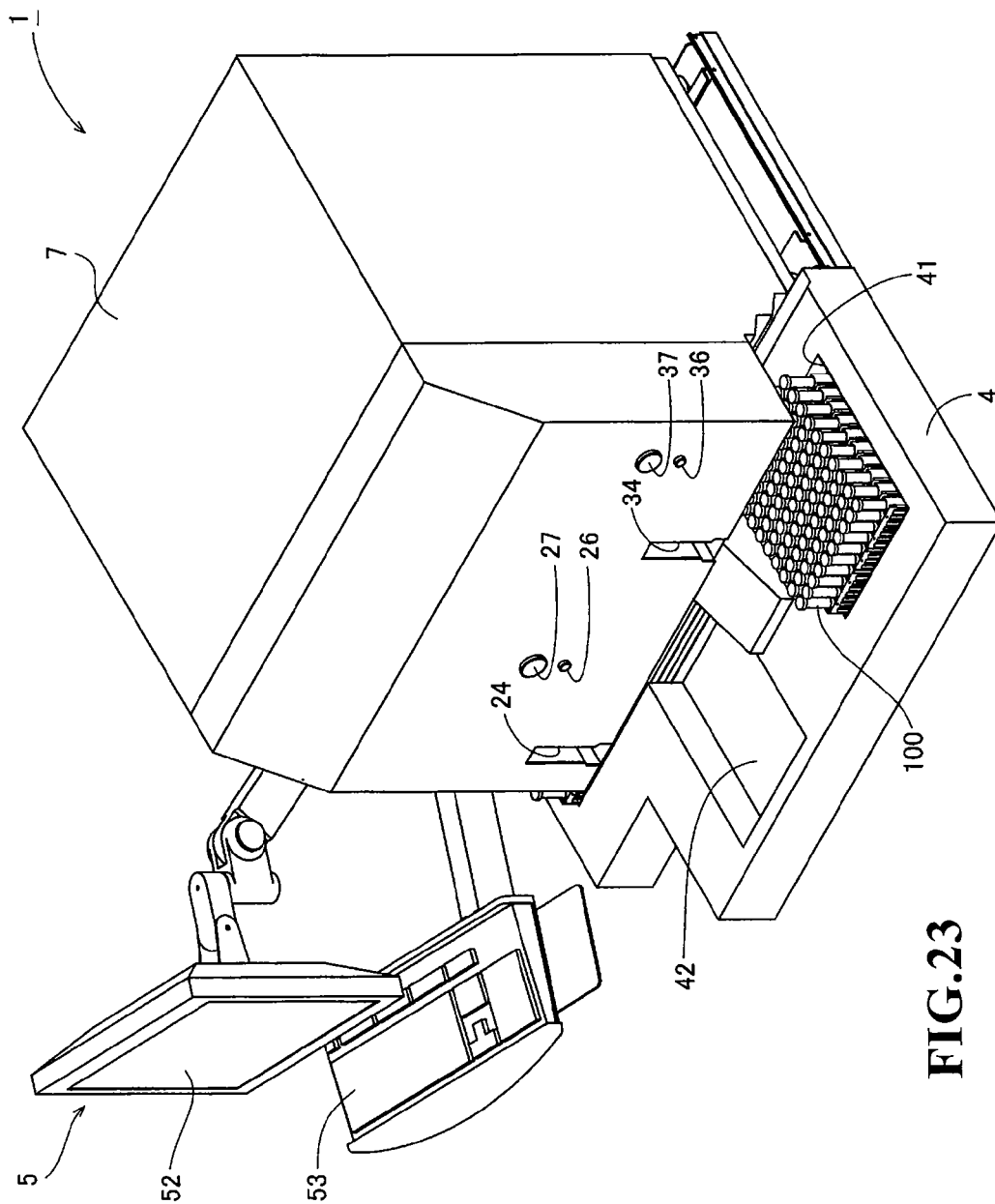


FIG. 23

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ANALYZER, SAMPLE TRANSPORTATION METHOD, AND COMPUTER PROGRAM PRODUCT

RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119 to Japanese Patent Application No. JP2008-057972 filed Mar. 7, 2008, the entire content of which is hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention relates to an analyzer, a sample transportation method for an analyzer, and a computer program product for controlling transportation of samples on an analyzer.

BACKGROUND OF THE INVENTION

There has been known an analyzer that automatically transports a plurality of samples and analyzes the transported samples (see U.S. Pat. No. 7,283,217 and US Patent Publication No. 2007-110617). In such an analyzer, one transportation device is connected to one measurement unit.

However, in the analyzer described in U.S. Pat. No. 7,283,217 and US Patent Publication No. 2007-110617, only one measurement unit is provided for one transportation device. Accordingly, it is difficult to largely improve process performance of samples. On the other hand, when such an analyzer is provided with a plurality of measurement units, the process performance of samples is largely improved. However, in that case, a configuration of the transportation device has not been known. For example, to improve the process performance of samples, it is necessary to efficiently transport the samples to the plurality of measurement units. Accordingly, the size of the transportation device increases. When the size of the transportation device is reduced, it is difficult to efficiently transport the samples and thus the process performance of samples deteriorates. Particularly, when trying to process a prior sample, an analysis result of which needs to be obtained more promptly than the other samples, it is very difficult to efficiently transport the other samples.

SUMMARY OF THE INVENTION

The scope of the present invention is defined solely by the appended claims, and is not affected to any degree by the statements within this summary.

A first aspect of the present invention is an analyzer comprising: a first measurement unit for measuring samples; a second measurement unit for measuring samples; a transportation device for transporting samples to the first measurement unit and the second measurement unit; prior sample measurement instructor for instructing to measure a predetermined sample prior to the other samples; and a transportation controller for controlling the transportation device to reserve the transportation of the other samples to the second measurement unit and to perform the other transportation operation, when the prior sample measurement instructor has instructed to measure the predetermined sample by the second measurement unit prior to the other samples.

A second aspect of the present invention is a sample transportation method for an analyzer, the method comprising: (a) transporting a first sample to a first measurement unit; (b) transporting a second sample to a second measurement unit; (c) measuring the first sample by the first measurement unit;

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(d) measuring the second sample by the second measurement unit; (e) receiving an instruction of measuring a predetermined sample prior to the other samples; and (f) reserving the transportation of the second sample to the second measurement unit and performing the other transportation operation, when the instruction of measuring the predetermined sample by the second measurement unit prior to the other samples has been received.

A third aspect of the present invention is a computer program product for controlling transportation of samples on an analyzer comprising a first measurement unit, a second measurement unit, and a transportation device configured to transport samples to the first measurement unit and the second measurement unit, the computer program product comprising: a computer readable medium; and instructions, on the computer readable medium, adapted to enable a general purpose computer to perform operations, comprising: (a) transporting a first sample to the first measurement unit; (b) transporting a second sample to the second measurement unit; (c) measuring the first sample by the first measurement unit; (d) measuring the second sample by the second measurement unit; (e) receiving an instruction of measuring a predetermined sample prior to the other samples; and (f) reserving the transportation of the second sample to the second measurement unit and performing the other transportation operation, when the instruction of measuring the predetermined sample by the second measurement unit prior to the other samples has been received.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating an overall configuration of a blood analyzer according to a first embodiment of the invention.

FIG. 2 is a perspective view for explaining detailed sections of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 3 is a schematic diagram illustrating a measurement unit and a sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 4 is a perspective view illustrating a measurement unit and a sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 5 is a perspective view illustrating a rack and sample containers of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 6 is a plan view for explaining the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 7 is a side view for explaining the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 8 is a side view for explaining the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 9 is a block diagram for explaining a control device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 10 is a diagram illustrating a prior sample measurement instruction picture of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 11 is a flowchart for explaining a measurement processing operation performed by a measurement processing program of the blood analyzer according to the first embodiment shown in FIG. 1.

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FIG. 12 is a state transition diagram for explaining state transition of a first measurement unit and a second measurement unit of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 13 is a state transition diagram for explaining state transition of a sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 14 is a flowchart for explaining a process of determining the next operation of the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 15 is a diagram illustrating event notification of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 16 is a diagram illustrating priority of commands of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 17 is a flowchart for explaining an operation at the time of prior sample measurement of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 18 is a flowchart for explaining an operation of the sample transportation device in a modified example of the blood analyzer according to the first embodiment shown in FIG. 1.

FIG. 19 is a perspective view illustrating an overall configuration of a blood analyzer according to a second embodiment of the invention.

FIG. 20 is a flowchart for explaining an operation at the time of prior sample measurement of the blood analyzer according to the second embodiment shown in FIG. 19.

FIG. 21 is a perspective view illustrating an overall configuration of a blood analyzer according to a third embodiment of the invention.

FIG. 22 is a flowchart for explaining an operation at the time of prior sample measurement of the blood analyzer according to the third embodiment shown in FIG. 21.

FIG. 23 is a diagram for explaining a modified example of the blood analyzer according to the first embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will be described hereinafter with reference to the drawings. (First Embodiment)

FIG. 1 is a perspective view illustrating an overall configuration of a blood analyzer according to a first embodiment of the invention. FIG. 2 to FIG. 10 are views for explaining sections of the blood analyzer according to the first embodiment shown in FIG. 1. First, the overall configuration of the blood analyzer 1 according to the first embodiment of the invention will be described with reference to FIG. 1 to FIG. 10. In the first embodiment, the invention is applied to a blood analyzer that is an example of an analyzer.

As shown in FIG. 1 and FIG. 2, the blood analyzer 1 according to the first embodiment of the invention is provided with two measurement units of a first measurement unit 2 and a second measurement unit 3, a sample transportation device (sampler) 4 disposed on the front side of the first measurement unit 2 and the second measurement unit 3, and a control device 5 including a PC (personal computer) electrically connected to the first measurement unit 2, the second measurement unit 3, and the sample transportation device 4. The blood analyzer 1 is connected to a host computer 6 (see FIG. 3) by the control device 5.

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The blood analyzer 1 is not a transportation system in which a plurality of analyzers are connected by a transportation device but a standalone analyzer. In addition, the blood analyzer 1 may be mounted on the transportation system.

As shown in FIG. 1 to FIG. 4, the first measurement unit 2 and the second measurement unit 3 are substantially the same type of measurement units (In the embodiment, the second measurement unit 3 uses the same measurement principle as the first measurement unit 2, and measures samples with respect to the same measurement items. The second measurement unit 3 also measures measurement items which are not analyzed by the first measurement unit 2.), and are disposed adjacent to each other. Herein, the same type includes a case in which a plurality of measurement items of the first measurement unit 2 and a plurality of measurement items of the second measurement unit 3 are partially common, as well as a case in which two measurement units measure samples with respect to the completely same measurement items. As shown in FIG. 3, the first measurement unit 2 and the second measurement unit 3 include sample suction sections 21 and 31 for sucking blood as a sample from a sample container (test tube) 100, sample preparation sections 22 and 32 for preparing detection samples from the blood sucked by the sample suction sections 21 and 31, and detection sections 23 and 33 for detecting blood cells from the detection samples prepared by the sample preparation sections 22 and 32, respectively. The first measurement unit 2 and the second measurement unit 3 further include insertion holes 24 and 34 (see FIG. 1 and FIG. 2) for inserting a sample container 100 accommodated in a rack 101 (see FIG. 5) transported by the sample transportation device 4, and sample container transportation sections 25 and 35 for inserting the sample container 100 from the rack 101 therein and transporting the sample container 100 to a suction position (see FIG. 3) of the sample section sections 21 and 31, respectively. As shown in FIG. 1 and FIG. 2, sample set section open and close buttons 26 and 36 and prior sample measurement start buttons 27 and 37 are provided on the outer surface of the first measurement unit 2 and the second measurement unit 3, respectively.

Needles (not shown) are provided at the front end portions of the sample suction sections 21 and 31, respectively. The sample suction sections 21 and 31 are configured to move in the vertical direction (direction indicated by the arrow Z), respectively. The sample suction sections 21 and 31 are configured to pass through an airtight cap of the sample container 100 transported to the suction position by moving downward and to suck inner blood.

The detection sections 23 and 33 are configured to perform RBC detection (detection of red blood cell) and PLT detection (detection of platelet) by a sheath flow DC detection method and to perform HGB detection (detection of hemoglobin in blood) by an SLS-hemoglobin method. The detection sections 23 and 33 are configured to perform WBC detection (detection of white blood cell) by a flow cytometry method using semiconductor laser.

The detection result obtained by the detection sections 23 and 33 are transmitted to the control device 5, as measurement data (measurement result) of sample. The measurement data is a basis of a final analysis result (The final analysis result are the number of red blood cells, the number of platelets, the amount of hemoglobin, the number of white blood cells, etc.) provided for a user.

As shown in FIG. 3 and FIG. 4, the sample container transportation sections 25 and 35 has hand sections 251 and 351 for gripping the sample container 100, opening and closing sections 252 and 352 for opening and closing the hand sections 251 and 351 to grip the sample container 100, verti-

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cal moving sections **253** and **353** for straightly moving the hand sections **251** and **351** in the vertical direction (direction indicated by the arrow Z), and stirring sections **254** and **354** for moving the hand sections **251** and **351** in a pendulum shape in the vertical direction (direction indicated by the arrow Z), respectively. The sample container transportation sections **25** and **35** further have sample container moving sections **255** (see FIG. 3) and **355** for holding the sample container **100** acquired from the rack **101** by the hand sections **251** and **351** to sample set sections **255a** (see FIG. 3) and **355a**, and for horizontally and straightly moving in the direction indicated by the arrow Y to the suction position of the sample suction sections **21** and **31**, and barcode reading sections **256** and **356**, respectively.

The hand sections **251** and **351** are disposed above a transportation path of the rack **101** transported by the sample transportation device **4**, respectively. The hand sections **251** and **351** are configured so that when the sample container **100** is transported to a first providing position **43a** for providing samples at the first measurement unit **2** and a second providing position **43b** (see FIG. 3) for providing samples at the second measurement unit **3**, the hand sections **251** and **351** move downward (direction indicated by the arrow Z) to grip the sample container **100** accommodated in the rack **101** by opening and closing the opening and closing sections **252** and **352**, respectively. The hand sections **251** and **351** are configured to move the gripped sample container **100** upward to be extracted from the rack **101**, and then to move in a pendulum shape by the stirring sections **254** and **354** (e.g., 10 times reciprocation), respectively. Accordingly, it is possible to stir blood in the gripped sample container **100** by the hand sections **251** and **351**. After completion of stirring, the hand sections **251** and **351** are configured to move downward and then open the gripping of the sample container **100** by the opening and closing sections **252** and **352**. Accordingly, it is possible to set the sample container **100** at the sample set sections **255a** and **355a** of the sample container moving sections **255** and **355** by the hand sections **251** and **351**.

The opening and closing sections **252** and **352** are configured to open and close the hand sections **251** and **351** to grip the sample container **100** by power of air cylinders **252a** and **352a**, respectively.

The vertical moving sections **253** and **353** are configured to move the hand sections **251** and **351** in the vertical direction (direction indicated by the arrow Z) along rails **253b** and **353b** by power of stepping motors **253a** and **353a**, respectively.

The stirring sections **254** and **354** are configured to move the hand sections **251** and **351** in a pendulum shape in the vertical direction (direction indicated by the arrow Z) by power of stepping motors (not shown), respectively.

The sample container moving sections **255** and **355** are configured to horizontally move the sample set sections **255a** and **355a** in the direction indicated by the arrow Y by power of stepping motors (not shown), respectively. Accordingly, as shown in FIG. 3, the sample container moving sections **255** and **355** can transport the sample container **100** set at the sample set sections **255a** and **355a** to a prior sample set position, a stirring position, a barcode reading position, and a suction position. The sample container moving sections **255** and **355** are configured to pass through the upside of the transportation path of the rack **101** and transport the sample container **100**, so as to intersect the transportation path of the rack **101** transported in the direction indicated by the arrow X in the plan view. The sample set sections **255a** and **355a** are configured to move to a prior sample set position (see FIG. 3) when a user presses down the sample set section open and close buttons **26** and **36** (see FIG. 1 and FIG. 2). The sample

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container moving sections **255** and **355** are configured to clamp (fix) the sample container **100** at each suction position by a restriction section (not shown).

The barcode reading sections **256** and **356** are configured to read a barcode **100a** attached to each sample container **100** as shown in FIG. 5. The barcode reading sections **256** and **356** are configured to read the barcode **100a** of the sample container **100** while rotating in the horizontal direction with the sample container **100** as a target held to the sample set sections **255a** and **355a** by a rotation device (not shown). Accordingly, even when the barcode **100a** of the sample container **100** is attached to the opposite side to the barcode reading sections **256** and **356**, it is possible to turn the barcode **100a** toward the barcode reading sections **256** and **356** by rotating the sample container **100**. Each barcode **100a** of each sample container **100** is uniquely attached to each sample, and is used to manage the analysis result of each sample.

The sample set section open and close buttons **26** and **36** are configured to be pressed down by a user at the time of measuring a prior sample.

The prior sample measurement start buttons **27** and **37** are configured to be pressed down by a user. When the user sets a prior sample at the sample set sections **255a** and **355a** and then presses down the prior sample measurement start buttons **27** and **37**, the sample set sections **255a** and **355a** at which the prior sample is set are inserted into the measurement unit and the measurement is started.

As shown in FIG. 4 and FIG. 6, the sample transportation device **4** includes a before-analysis rack holding section **41** capable of holding the plurality of racks **101** accommodating the sample containers **100** for accommodating samples before performing analysis, an after-analysis rack holding section **42** capable of holding the plurality of racks **101** accommodating the sample containers **100** for accommodating the samples after performing analysis, a rack transportation section **43** for horizontally and straightly moving the rack **101** in the direction indicated by the arrow X, a barcode reading section **44**, a presence sensing sensor **45** (see FIG. 4) for sensing whether or not there is the sample container **100**, and a rack output section **46** for moving the rack **101** into the after-analysis rack holding section **42**.

The before-analysis rack holding section **41** having a rack input section **411** is configured to output the rack **101** held to the before-analysis rack holding section **41** one by one onto the rack transportation section **43** by moving the rack input section **411** in the direction indicated by the arrow Y. The rack input section **411** is configured to be driven by a stepping motor (not shown) provided below the before-analysis rack holding section **41**. The before-analysis rack holding section **41** having a restriction section **412** (see FIG. 4) in the vicinity of the rack transportation section **43** is configured to restrict movement of the rack **101** so that the rack **101** output onto the rack transportation section **43** once does not return into the before-analysis rack holding section **41**.

The after-analysis rack holding section **42** having a restriction section **421** (FIG. 4) in the vicinity of the rack transportation section **43** is configured to restrict movement of the rack **101** so that the rack **101** moved into the after-analysis rack holding section **42** once does not return to the rack transportation section **43**.

As shown in FIG. 3, the rack transportation section **43** is configured to transport the rack **101** so that the samples are transported to the first providing position **43a** for providing samples at the first measurement units **2** and the second providing position **43b** for providing samples at the second measurement unit **3**. The rack transportation section **43** is configured to transport the rack **101** so as to transport the samples to

a sample presence check position **43c** for checking whether or not there is the sample container **100** for accommodating the samples by the presence sensing sensor **45** and a reading position **43d** for reading the barcode **100a** of the sample container **100** for accommodating the samples by the barcode reading section **44**.

The rack transportation section **43** has two belts of a first belt **431** and a second belt **432** capable of moving independently from each other. Widths **b1** and **b2** (see FIG. 6) of the first belt **431** and the second belt **432** in the direction indicated by the arrow **Y** are a half of a width **B** of the rack **101** in the direction indicated by the arrow **Y** or smaller. Accordingly, the first belt **431** and the second belt **432** are disposed in parallel so as not to protrude from the width **B** of the rack **101** when the rack transportation section **43** transports the rack **101**. As shown in FIG. 7 and FIG. 8, the first belt **431** and the second belt **432** have a ring shape, and are disposed to surround rollers **431a** to **431c** and rollers **432a** to **432c**, respectively. Two protrusion pieces **431d** and **432d** are each formed at outer peripheral sections of the first belt **431** and the second belt **432** to have an inner width **w1** (see FIG. 7) and **w2** (see FIG. 8) slightly (e.g., about 1 mm) larger than the width **W** of the rack **101** in the direction indicated by the arrow **X**. The first belt **431** is configured to move the rack **101** in the direction indicated by the arrow **X** by moving along outer peripheries of the rollers **431a** to **431c** by a stepping motor **431e** (see FIG. 4), with the rack **101** held in the protrusion piece **431d**. The second belt **432** is configured to move the rack **101** in the direction indicated by the arrow **X** by moving along outer peripheries of the rollers **432a** to **432c** by a stepping motor **432e** (see FIG. 4), with the rack **101** held in the protrusion piece **432d**. The first belt **431** and the second belt **432** are configured to move the rack **101** independently from each other.

The barcode reading section **44** is configured to read the barcode **100a** of the sample container **100** shown in FIG. 5 and to read the barcode **101a** attached to the rack **101**. The barcode reading section **44** is configured to read the barcode **100a** of the sample container **100** while rotating in the horizontal direction with the sample container **100** as a target accommodated in the rack **101** by a rotation device (not shown). Accordingly, even when the barcode **100a** of the sample container **100** is attached to the opposite side to the barcode reading section **44**, it is possible to turn the barcode **100a** toward the barcode reading section **44** by rotating the sample container **100**. The barcode **101a** of the rack **101** is uniquely attached to each rack, and is used to manage the analysis result of each sample.

The presence sensing sensor **45** is a contact type sensor, and has a contact piece **451** (see FIG. 4) having a curtain shape, a light emitting element (not shown) emitting light, and a light receiving element (not shown). The presence sensing sensor **45** is configured so that the contact piece **451** is bent when the contact piece **451** comes into contact with a sensing object that is a sensing target, and thus light emitted from the light emitting element is reflected to the contact piece **451**, and the reflected light enters the light receiving element. Accordingly, when the sample container **100** that is a sensing target accommodated in the rack **101** passes through the downside of the presence sensing sensor **45**, the contact piece **451** is bent by the sample container **100**, thereby sensing that there is the sample container **100**.

The rack output section **46** is opposed to the after-analysis rack holding section **42** with the rack transportation section **43** interposed therebetween, and is configured to horizontally and straightly move in the direction indicated by the arrow **Y**. Accordingly, when the rack **101** is transported to a position

(hereinafter, referred to as a rack output position) between the after-analysis rack holding section **42** and the rack output section **46**, the rack output section **46** is moved to the after-analysis rack holding section **42**, thereby pressing the rack **101**. Therefore, it is possible for the rack **101** to move into the after-analysis rack holding section **42**.

As shown in FIG. 1, FIG. 2, and FIG. 9, the control device **5** is configured of a personal computer (PC) or the like, and includes a control unit **51** configured of a CPU, a ROM, a RAM, and the like, a display unit **52**, and an input device **53**. The display unit **52** is provided to display analysis results and the like obtained by analyzing data of digital signals transmitted from the first measurement unit **2** and the second measurement unit **3**. The display unit **52** is configured to input sample identification numbers for identifying samples by a user or to display a prior sample measurement instruction picture **520** (see FIG. 10) for setting measurement items and the like, in the measurement of a prior sample needing to be measured prior to the other samples.

Next, a configuration of the control device **5** will be described. As shown in FIG. 9, the control device **5** is configured of a computer **500** mainly including a control unit **51**, a display unit **52**, and an input device **53**. The control unit **51** mainly includes a CPU **51a**, a ROM **51b**, a RAM **51c**, a hard disk **51d**, a readout device **51e**, an input/output interface **51f**, a communication interface **51g**, and an image output interface **51h**. The CPU **51a**, the ROM **51b**, the RAM **51c**, the hard disk **51d**, the readout device **51e**, the input/output interface **51f**, the communication interface **51g**, and the image output interface **51h** are connected by a bus **51i**.

The CPU **51a** can execute a computer program stored in the ROM **51b** and a computer program loaded on the RAM **51c**. The CPU **51a** executes application programs **54a** to **54c**, whereby the computer **500** functions as the control device **5**.

The ROM **51b** is configured of a mask ROM, a PROM, an EPROM, an EEPROM, or the like, in which computer programs executed by the CPU **51a** and data used for the computer programs are recorded.

The RAM **51c** is configured of an SRAM, a DRAM, or the like. The RAM **51c** is used to read the computer programs recorded in the ROM **51b** and the hard disk **51d**. The RAM **51c** is used as a work area of the CPU **51a** when the computer programs are executed.

In the hard disk **51d**, various computer programs such as an operating system and application programs executed by the CPU **51a**, and data used for executing the computer programs are installed. A measurement processing program **54a** for the first measurement unit **2**, a measurement processing program **54b** for the second measurement unit **3**, and a measurement processing program **54c** for the sample transportation device **4** are also installed in the hard disk **51d**. The application programs **54a** to **54c** are executed by the CPU **51a**, thereby controlling an operation of each section of the first measurement unit **2**, the second measurement unit **3**, and the sample transportation device **4**. A measurement result database **54d** is also installed therein.

The readout device **51e** is configured of a flexible disk drive, a CD-ROM drive, a DVD-ROM drive, or the like, and can read computer programs or data recorded in a transportable recording medium **54**. The application programs **54a** to **54c** are stored in the transportable recording medium **54**, the computer **500** reads the application programs **54a** to **54c** from the transportable recording medium **54**, and the application programs **54a** to **54c** can be installed in the hard disk **51d**.

The application programs **54a** to **54c** are not provided only by the transportable recording medium **54** but may be provided from an external device connected to communicate

with the computer 500 by an electric communication line (irrespective of wire and wireless) through the electric communication line. For example, the application programs 54a to 54c are stored in a hard disk of a server computer on the Internet, the computer 500 accesses to the server computer, the application programs 54a to 54c are downloaded, and the application programs 54a to 54c are installed in the hard disk 51d.

An operating system providing graphical user interface environment such as Windows (trade mark) produced by Microsoft Inc. in USA is installed in the hard disk 51d. In the following description, it is assumed that the application programs 54a to 54c are operated on the operating system.

The input/output interface 51f is configured of, for example, a serial interface such as USB, IEEE1394, and RS-232C, a parallel interface such as SCSI, IDE, and IEEE1284, an analog interface including a D/A converter and A/D converter, and the like. The input device 53 is connected to the input/output interface 51f, and a user uses the input device 53, thereby inputting data to the computer 500.

The communication interface 51g is, for example, an Ethernet (trade mark) interface. The computer 500 can transmit and receive data among the first measurement unit 2, the second measurement unit 3, the sample transportation device 4, and the host computer 6 using a predetermined communication protocol by the communication interface 51g.

The image output interface 51h is connected to the display unit 52 configured of LCD, CRT, or the like, and displays video signals based on the image data given from the CPU 51a on the display unit 52. The display unit 52 displays images (picture) according to the input video signals.

The control unit 51 is configured to analyze components of an analysis target using the measurement result transmitted from the first measurement unit 2 and the second measurement unit 3, and to acquire the analysis result (the number of red blood cells, the number of platelets, the amount of hemoglobin, the number of white blood cells, etc.).

As shown in FIG. 5, ten container accommodating sections 101b are formed in the rack 101 to accommodate ten sample containers 100 in series. The container accommodating sections 101b are provided with opening sections 101c so that the barcode 100a of each accommodated sample container 100 is visible.

FIG. 11 is a flowchart for explaining measurement processing operations by the measurement processing programs of the blood analyzer according to the first embodiment shown in FIG. 1. Next, the measurement processing operations by the measurement processing programs 54a and 54b of the blood analyzer 1 according to the first embodiment will be described with reference to FIG. 11. The components of the analysis target are measured in the first measurement unit 2 and the second measurement unit 3 in the same manner. Accordingly, the case where the components of the analysis target are measured by the first measurement unit 2 will be described herein as a representative example.

First, in Step S1, suction of samples is performed from the sample container 100 to the suction position (see FIG. 3) by the sample suction section 21. In Step S2, a detection sample is prepared from the sucked sample by the sample preparation section 22. In Step S3, components of the analysis target are detected from the detection sample by the detection section 23. In Step S4, measurement data is transmitted from the first measurement unit 2 to the control device 5. Then, in Step S5, the components of the analysis target are analyzed by the control unit 51 on the basis of the measurement result trans-

mitted from the first measurement unit 2. The analysis of the sample is completed by Step S5, and the operation is completed.

FIG. 12 is a state transition diagram for explaining state transition of the first measurement unit and the second measurement unit of the blood analyzer according to the first embodiment shown in FIG. 1. Next, the state transition of the first measurement unit 2 and the second measurement unit 3 of the blood analyzer 1 according to the first embodiment will be described with reference to FIG. 12. In the first measurement unit 2 and the second measurement unit 3, the state transition is the same. Accordingly, hereinafter, the state transition of the first measurement unit 2 will be described as a representative example.

In the first embodiment, the state of the first measurement unit 2 is transitioned from a non-operating state (start) to a sampler mode standby state 2a by powering on. In the sampler mode standby state 2a, when sampler measurement start is instructed by a user, the first measurement unit 2 is transitioned to a sampler mode measuring state 2b. In the sampler mode measuring state 2b, the measurement processing operations shown in FIG. 11 are performed by the first measurement unit 2. In the sampler mode measuring state 2b, when the measurement of the sample is completed, the first measurement unit 2 is returned to the sampler mode standby state 2a. In the sampler mode standby state 2a, when the power is turned off, the first measurement unit 2 is transitioned to the non-operating state (end).

In the first embodiment, when the sample set section open and close button 26 is pressed down by a user in the sampler mode standby state 2a and the sampler mode measuring state 2b, the first measurement unit 2 is transitioned to a prior sample measurement mode standby state 2c. When the first measurement unit 2 is transitioned to the prior sample measurement mode standby state 2c, the transportation of the sample to the first measurement unit 2 is reserved. That is, in this case, the sample transportation device 4 does not transport the samples to the first providing position 43a, but transports the samples to only the second providing position 43b. When both of the first measurement unit 2 and the second measurement unit 3 are transitioned to the prior sample measurement mode standby state 2c, the transportation of the samples are reserved to both of the first providing position 43a and the second providing position 43b.

In the prior sample measurement mode standby state 2c, when the prior sample measurement start button 27 is pressed down, the first measurement unit 2 is transitioned to the prior sample measurement mode measuring state 2d. When the measurement of the prior sample is completed, the first measurement unit 2 is returned to the prior sample measurement mode standby state 2c. When the measurement of all prior samples are completed, the first measurement unit 2 is transitioned to the sampler mode standby state 2a by pressing down the sample set section open and close button 26 by a user.

In each state of the sampler mode standby state 2a, the sampler mode measuring state 2b, the prior sample measurement mode standby state 2c, and the prior sample measurement mode measuring state 2d, when an error occurs, the first measurement unit 2 is transitioned to an interruption/discontinuation occurrence state 2e. When the error is removed, the first measurement unit 2 is returned to the mode standby state of each state. Specifically, when the error occurring in the sampler mode standby state 2a and the sampler mode measuring state 2b is removed, the first measurement unit 2 is returned to the sampler mode standby state 2a. When the error occurring in the prior sample measurement mode standby state 2c and the prior sample measurement measuring state 2d is removed,

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the first measurement unit 2 is returned to the prior sample measurement mode standby state 2c.

When the state of the first measurement unit 2 is transited, a notification for notifying what state the first measurement unit 2 is transited to is transmitted from the first measurement unit 2 to the control device 5. Specifically, when the first measurement unit 2 is transited from the sampler mode measuring state 2b, the prior sample measurement mode standby state 2c, and the interruption/discontinuance occurrence state 2e to the sampler mode standby state 2a, a state notification for notifying that the first measurement unit 2 is transited to the sampler mode standby state 2a is transmitted from the first measurement unit 2 to the control device 5. When the first measurement unit 2 is transited to the other state than the sampler mode standby state 2a, a state notification for notifying that the first measurement unit 2 is in the state is transmitted from the first measurement unit 2 to the control device 5. When the first measurement unit 2 is returned from the interruption/discontinuance occurrence state 2e to each state, a state notification for notifying what state the first measurement unit 2 is transited to is transmitted from the first measurement unit 2 to the control device 5, and a notification for notifying that the error is removed is transmitted together.

FIG. 13 is a state transition diagram for explaining state transition of the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1. FIG. 14 is a flowchart for explaining a process of determining the next operation of the sample transportation device of the blood analyzer according to the first embodiment shown in FIG. 1. FIG. 15 and FIG. 16 are diagrams for explaining a detailed configuration of the blood analyzer according to the first embodiment shown in FIG. 1. First, the state transition of the sample transportation device 4 of the blood analyzer 1 according to the first embodiment will be described with reference to FIG. 13.

In the first embodiment, when a user instructs sampler measurement start, the state of the sample transportation device 4 becomes a next operation determination processing state 4a. This state is a waiting state for the sample transportation device 4 to execute operations registered in a queue for registering commands. In the first embodiment, the queue is a data structure in which operation instructions to the sample transportation device 4 are registered, and the sample transportation device 4 is controlled by the CPU 51a of the control device 5 to execute the operations registered in the queue. The queue is stored in the RAM 51c or the hard disk 51d of the control device 5.

The process of determining the next operation performed by the sample transportation device 4 when the sample transportation device 4 of the blood analyzer 1 according to the first embodiment is in the next operation determination processing state 4a will be described with reference to FIG. 14 to FIG. 16.

In Step S11 shown in FIG. 14, a notification of an event is waited by the CPU 51a. In the first embodiment, the notification of the event is notifications of 11 kinds of events shown in FIG. 15, and includes a notification for notifying that a predetermined operation is completed, a state notification for notifying a state of the measurement unit, and the like. Specifically, when the rack 101 is input from the before-analysis rack holding section 41 of the sample transportation device 4 onto the rack transportation section 43, a rack input completion notification is transmitted from the sample transportation device 4 to the control device 5. When the rack 101 on the rack transportation section 43 is output to the after-analysis rack holding section 42 by the rack output section 46, a rack output completion notification is transmitted from the sample trans-

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portation device 4 to the control device 5. When it is sensed whether or not there is the sample container 100 by the presence sensing sensor 45 of the sample transportation device 4, a test tube presence check completion notification is transmitted. When the barcode 100a of the sample container 100 is read by the barcode reading section 44 and a measurement order is assigned, a sample ID/measurement order assignment completion notification is transmitted. A test tube insertion completion notification to first measurement unit, a test tube insertion completion notification to second measurement unit, a test tube extraction completion notification from first measurement unit, and a test tube extraction completion notification from second measurement unit are transmitted from the first measurement unit 2 and the second measurement unit 3 to the control device 5, when each operation in the first measurement unit 2 and the second measurement unit 3 is completed. In addition to state notifications of the first measurement unit 2 and the second measurement unit 3, a test tube extraction request notification for notifying that the sample container 100 is ready to be extracted from the first measurement unit 2 and the second measurement unit 3 and a next sample suction ready notification for notifying that a next new sample is ready to be sucked are transmitted from the first measurement unit 2 and the second measurement unit 3 to the control device 5.

In Step S12, it is determined whether or not any one event notification of the notifications of the 11 kinds of events is received by the CPU 51a, and the event notification waiting state continues until any one event notification is received. When any one event notification is received, the execution reservation of the operation set in the reservation state not to be performed among the operations registered in the queue is released by the CPU 51a, in Step S13.

The execution reservation will be described hereinafter. In the first embodiment, as shown in FIG. 16, the operations registered in the queue are provided with priorities, and the sample transportation device 4 is controlled by the CPU 51a so that a high-priority operation is first performed from the operations registered in the queue at the time of performing the operation. However, there may be a case where two operations of "test tube insertion to first measurement unit" and "test tube insertion to second measurement unit" cannot be instantly performed, for example, a case where there is the other sample, which is being measured, in the first measurement unit 2 and the second measurement unit 3, and the next new sample cannot be inserted. In such a case, the execution of the operations of "test tube insertion to first measurement unit" and "test tube insertion to second measurement unit" is set as a reservation state by the CPU 51a, so that the operations of "test tube insertion to first measurement unit" and "test tube insertion to second measurement unit" are skipped and a subsequent high-priority operation is first performed. Accordingly, in the blood analyzer 1 according to the first embodiment, even when the operations of "test tube insertion to first measurement unit" and "test tube insertion to second measurement unit" cannot be performed, the other operation than "test tube insertion to first measurement unit" and "test tube insertion to second measurement unit" is first performed. Therefore, it is possible to promptly perform the process of the samples.

In Step S14, the highest-priority operation is searched from the operations registered in the queue in the present state by the CPU 51a. In Step S15, it is determined whether the searched highest-priority operation is any one of "test tube insertion to first measurement unit" or "test tube insertion to second measurement unit". When the operation is not any one of "test tube insertion to first measurement unit" and "test

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tube insertion to second measurement unit”, the searched highest-priority operation is performed in Step S16. At this time, when the rack output operation is performed, the rack output section 46 is controlled to output the rack 101 on the rack transportation section 43 to the after-analysis rack holding section 42 by the CPU 51a. When the rack input operation is performed, the rack input section 411 is controlled to input the rack 101 of the before-analysis rack holding section 41 onto the rack transportation section 43 by the CPU 51a. When the test tube extraction operation from the first measurement unit or the test tube extraction operation from the second measurement unit is performed, the rack transportation section 43 is controlled to transport the rack 101 by the CPU 51a, so that the container accommodating section 101b of the extracted sample container 100 corresponds to any one of the first providing position 43a or the second providing position 43b. When the test tube presence check operation is performed, the rack transportation section 43 is controlled to transport the rack 101 by the CPU 51a, so that the unchecked sample container 100 accommodated in the rack 101 reaches the sample presence check position 43c. When the sample ID/measurement order assignment operation is performed, the rack transportation section 43 is controlled to transport the rack 101, so that the sample container 100 accommodated in the rack 101 and to which a measurement order is not yet assigned reaches the reading position 43d. Then, the operation is completed.

On the other hand, when the operation is any one operation of “test tube insertion to first measurement unit” or “test tube insertion to second measurement unit”, it is determined whether or not the corresponding operation of “test tube insertion to first measurement unit” or “test tube insertion to second measurement unit” can be performed by the CPU 51a on the basis of the measurement order and the state of the first measurement unit 2 and the second measurement unit 3 in Step S17. Specifically, the CPU 51a determines whether or not the measurement unit corresponding to the first measurement unit 2 or the second measurement unit 3 is in a state capable of inserting the test tube, on the basis of the state notifications transmitted from the measurement units, the test tube extraction request notification, and the next sample suction ready notification. For example, when the next sample suction ready notification is not transmitted from the first measurement unit 2, the CPU 51a determines that the first measurement unit 2 is not in the state capable of inserting the test tube. In the case of the state capable of inserting the test tube, the corresponding operation of “test tube insertion to first measurement unit” or “test tube insertion to second measurement unit” is performed in Step S18. At this time, the rack transportation section 43 is controlled to transport the rack 101 by the CPU 51a, so that the container accommodating section 101b of the extracted sample container 100 is opposed to any one of the first providing position 43a or the second providing position 43b. Then, the operation is completed. In the case incapable of inserting the test tube, the execution of the corresponding operation of “test tube insertion to first measurement unit” or “test tube insertion to second measurement unit” is set as the reservation state by the CPU 51a in Step S19.

As described above, the operation performed next time by the sample transportation device 4 is determined on the basis of the latest state of each of the first measurement unit 2 and the second measurement unit 3, immediately before the sampler transportation device 4 performs the next operation by CPU 51a. Accordingly, since the sample transportation device 4 can perform efficient transportation based on the

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latest state of each of the first measurement unit 2 and the second measurement unit 3, it is possible to promptly perform the process of the samples.

In the next operation determination processing state 4a shown in FIG. 13, when the next operation is performed by the above-described process of FIG. 14, the sample transportation device 4 is transited to states 4b to 4i corresponding to the operations. Specifically, the sample transportation device 4 may be transited to 9 kinds of states of a rack inputting state 4b, a test tube presence checking state 4c, a sample ID/measurement order assigning state 4d, a test tube inserting state 4e to first measurement unit, a test tube inserting state 4f to second measurement unit, a test tube extracting state 4g from first measurement unit, a test tube extracting state 4h from second measurement unit, and a rack outputting state 4i, in addition to the next operation determination processing state 4a.

In FIG. 13, the operations performed in the next operation state is shown, as “NEXT;”. In FIG. 13, the events notified to the control device 5 at the time of being transited from each operation state to the next operation determination processing state 4a are shown, as “I;”, and the operations registered in the queue are shown, as “C;”. For example, when the sample transportation device 4 is in the rack inputting state 4b, the rack input operation shown as “NEXT;” are performed. When the sample transportation device 4 is transited from the rack inputting state 4b to the next operation determination processing state 4a, the event notification for notifying the rack input completion shown as “I;” is transmitted to the control device 5, and the test tube presence check operation shown as “C;” is registered in the queue by the CPU 51a. For the other event shown in FIG. 15, the notification is performed in the same manner as the rack input completion notification. In addition, for the other operation shown in FIG. 16, the registration to the queue is performed in the same manner as the test tube presence check operation. The two operations of “test tube extraction from first measurement unit” and “test tube extraction from second measurement unit” are registered in the queue on the basis of the test tube extraction request transmitted from the first measurement unit 2 and the second measurement unit 3.

In the case where the sample transportation device 4 is in the test tube inserting state 4e to first measurement unit, when the sample container 100 inserted to the first measurement unit 2 is transported to a predetermined position, the insertion request notification for notifying completion of transportation to a predetermined position is transmitted to the first measurement unit 2. On the basis of the notification, the CPU 51a can control the first measurement unit 2 so that the sample container 100 is gripped by the hand section 251. For the second measurement unit 3, the insertion request notification is transmitted in the same manner as the first measurement unit 2.

FIG. 17 is a flowchart for explaining the operation at the time of prior sample measurement of the blood analyzer according to the first embodiment shown in FIG. 1. Next, the operation at the time of prior sample measurement of the blood analyzer 1 according to the first embodiment will be described with reference to FIG. 1, FIG. 2, FIG. 10, and FIG. 17. In the first embodiment, the first measurement unit 2 and the second measurement unit 3 can measure prior samples independently from each other, and the operations at the time of prior sample measurement in the first measurement unit 2 and the second measurement unit 3 are the same. Accordingly, the operation at the time of prior sample measurement in the first measurement unit 2 will be described herein as a representative example.

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First, in Step S101 shown in FIG. 17, it is determined whether or not the sample set section open and close button 26 (see FIG. 1 and FIG. 2) is pressed down by the CPU 51a, and the determination is repeated until the sample set section open and close button 26 is pressed down. When the sample set section open and close button 26 is pressed down, the sample set section 255a (see FIG. 2) protrudes out of the insertion hole 24 in Step S102. In Step S103, the prior sample measurement instruction picture 520 (see FIG. 10) is displayed on the display unit 52. In Step S104, after a user inputs a sample identification number or sets measurement items, it is determined whether or not the OK button 520a displayed on the prior sample measurement instruction picture 520 is pressed down by the CPU 51a. The determination is continued until the OK button 520a is pressed down. When the OK button 520a is pressed down, the user sets the sample container 100 accommodating the prior sample at the sample set section 255a in Step S105 and then it is determined whether or not the prior sample measurement start button 27 (see FIG. 1 and FIG. 2) is pressed down by the CPU 51a. When the prior sample measurement start button 27 is not pressed down, the determination is repeated. When the prior sample measurement start button 27 is pressed down, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 2 in Step S106. Accordingly, the prior sample is inserted into the first measurement unit 2.

In Step S107, the measurement of the prior sample is performed. In Step S108, it is determined whether or not the measurement is completed. The determination is repeated until the measurement is completed. When the measurement is completed, the sample set section 255a comes out of the insertion hole 24 in Step S109. Accordingly, the sample container 100 of the measured prior sample is discharged out of the first measurement unit 2 so as to be extracted. Then, in Step S110, it is determined whether or not the prior sample measurement start button 27 is pressed down.

In the first embodiment, the user removes the sample container 100 of the measured prior sample from the sample set section 255a, and then sets the sample container 100 accommodating a next new prior sample at the sample set section 255a. The prior sample measurement start button 27 is pressed down, thereby continuously performing the measurement of the prior sample. When the user sets the sample container 100 accommodating the next new prior sample at the sample set section 255a and presses down the prior sample measurement start button 27, the operation is transferred to Step S106 and the measurement of the next prior sample is continuously performed. In this case, even when the user does not input the sample identification number or set the measurement items, continuous identification numbers are automatically assigned by the CPU 51a and the measurement is continued with the same items according to the once set measurement items.

When the prior sample measurement start button 27 is not pressed down, it is determined whether or not the sample set section open and close button 26 is pressed down by the CPU 51a in Step S111. The user may cancel the measurement of the prior sample by pressing down the sample set section open and close button 26. When the sample set section open and close button 26 is not pressed down, the determination is repeated until any one of the prior sample measurement start button 27 and the sample set section open and close button 26 is pressed down. When the sample set section open and close button 26 is pressed down, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 2 in Step S112 and the measurement operation of the prior sample is completed.

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In the first embodiment, as described above, the sample set section open and close buttons 26 and 36 for instructing the measurement of the prior sample prior to the other samples are provided. Accordingly, when the user instructs the measurement of the prior sample using the sample set section open and close button 26 or 36, the measurement of the prior sample is performed prior to the other samples. Therefore, it is possible to promptly perform the process of the prior sample needing to be processed prior to the other samples. In the blood analyzer 1 according to the first embodiment, when the measurement of the prior sample using any one of the first measurement unit 2 and the second measurement unit 3 is instructed by the sample set section open and close button 26 or 36, the transportation of the sample to the first providing position 43a or the second providing position 43b is reserved. In addition, since the CPU 51a for controlling the sample transportation device 4 to perform the other operation is provided, it is possible to perform the process of the other samples together with the measurement of the prior sample while performing the measurement of the prior sample with the second measurement unit 3, for example, even when the measurement of the prior sample needing to be processed prior to the other samples using the second measurement unit 3 is instructed. Accordingly, it is not necessary to reserve the process of the other samples. Therefore, even when there are a large number of prior samples needing to be processed prior to the other samples, it is possible to suppress great delay of the process of the other samples. In addition, when the user directly provides the prior sample to the second measurement unit 3 in which the transportation of the other samples is reserved, it is not necessary to transport the prior sample by the sample transportation device 4. Therefore, it is possible to more promptly perform the process of the prior sample needing to be processed prior to the other samples, as much as the transportation time of the prior sample. Accordingly, in blood analyzer 1 according to the first embodiment, it is possible to promptly perform the process of the prior sample while avoiding the large device size, without great delay of the process of the other samples in addition to the prior sample needing to be processed prior to the other samples.

In the first embodiment, the sample set section open and close buttons 26 and 36 for instructing the measurement of the prior sample are provided for the first measurement unit 2 and the second measurement unit 3, respectively. Accordingly, the user can easily instruct the measurement of the prior sample by pressing down the sample set section open and close button 26 or 36.

In the first embodiment, the user removes the sample container 100 of the measured prior sample from the sample set section 255a and then sets the sample container 100 accommodating the next new prior sample at the sample set section 255a. Accordingly, it is possible to continuously perform the measurement of the prior sample by pressing down the prior sample measurement start button 27. Therefore, it is possible to reduce burden of the user at the time of measuring the prior sample.

In the first embodiment, the next operation performed next time by the sample transportation device 4 is determined by the CPU 51a on the basis of the latest state of each of the first measurement unit 2, the second measurement unit 3, and the sample transportation device 4 immediately before the next operation is performed by the sample transportation device 4. However, the invention is not limited thereto, and the sample transportation device 4 may be controlled by the CPU 51a so that a plurality of samples are alternately transported to the first measurement unit 2 and the second measurement unit 3, when the measurement of the prior sample is not instructed by

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the user. Accordingly, when there is no prior sample needing to be processed prior to the other samples, it is possible to efficiently transport the other samples to the first measurement unit 2 and the second measurement unit 3. Therefore, it is possible to promptly perform the process of the samples.

FIG. 18 is a flowchart for explaining the operation of the sample transportation device in a modified example of the blood analyzer according to the first embodiment shown in FIG. 1. Next, the operation of the sample transportation device 4 in the modified example of the blood analyzer 1 according to the first embodiment will be described with reference to FIG. 3 and FIG. 18. In the modified example, the sampler operation processing program 54c installed in the control device 5 is different from that of the blood analyzer according to the first embodiment. The sampler operation processing program 54c in the modified example sequentially controls the sample transportation device 4.

When sampler measurement start is instructed by a user, the rack 101 is input from the before-analysis rack holding section 41 (see FIG. 3) to the rack transportation section 43 (see FIG. 3) in Step S21. In Step S22, it is determined whether or not the measurement of the prior sample is instructed by the user. Specifically, it is determined whether or not the sample set section open and close button 26 or 36 is pressed down by the user, by the CPU 51a of the control device 5. Where the measurement is not instructed, the sample of the N^{th} sample container 100 is transported to the first measurement unit 2 by the rack transportation section 43 in Step S23. In Step S24, it is determined again whether or not the measurement of the prior sample is instructed by the user, by the CPU 51a. Herein N , is a real number starting from 1. Accordingly, when the operation of Step S23 is performed first, the sample of the first sample container 100 is transported as $N=1$ to the first measurement unit 2.

When the measurement of the prior sample is instructed, the operation is transferred to Step S46. When the measurement is not instructed, the sample of $(N+1)^{\text{th}}$ sample container 100 is transported to the second measurement unit 3 by the rack transportation section 43 in Step S25. In Step S26, it is determined whether or not the measurement of the prior sample is instructed by the user. When the measurement is not instructed, it is determined whether or not $N=9$ in Step S27. When N is not equal to 9, N is changed to $(N+2)$ in Step S28. That is, when $N=1$ immediately before the operation is transferred to Step S28, N is changed to 3 in Step S28. This process is performed for the CPU 51a to control the sample transportation device 4, so that the sample are alternately transported to the two measurement units of the first measurement unit 2 and the second measurement unit 3. Then, the operation is transferred to Step S23. In Step S27, when $N=9$, the rack 101 is output from the rack transportation section 43 to the after-analysis rack holding section 42 in Step S36. Then, the operation is completed. In Step S26, when the measurement of the prior sample is instructed, the operation is transferred to Step S45 and N is changed to $(N+2)$.

In Step S22, when the measurement of the prior sample is instructed, it is determined whether or not the measurement of the prior sample is instructed on the first measurement unit 2 side in Step S29. When the measurement is not instructed on the first measurement unit 2 side, the operation is transferred to Step S52 as described latter. When the measurement is instructed on the first measurement unit 2 side, the sample of the N^{th} sample container 100 is transported to the second measurement unit 3 in Step S30. In Step S31, it is determined whether or not the completion of the measurement of the prior sample is instructed. When the completion is not instructed, the sample of the $(N+1)^{\text{th}}$ sample container 100 is also trans-

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ported to the second measurement unit 3 in Step S32. Then, in Step S33, it is determined whether or not the completion of the measurement of the prior sample is instructed. When the completion is not instructed, it is determined whether or not $N=9$ in Step S34. When $N=9$, the CPU 51a determines that the sample transportation device 4 has transported the tenth sample container 100 accommodated in the rack 101 to the second measurement unit 3, and the operation is transferred to Step S36. When N is not equal to 9, the CPU 51a determines that the sample transportation device 4 has not transported all ten sample containers 100 accommodated in the rack 101 to the measurement unit. In Step S35, N is changed to $(N+2)$. Then, the operation is returned to Step S30. In Step S33, when the completion is instructed, N is changed to $(N+2)$ in Step S37 and the operation is transferred to Step S23.

In Step S31, when the completion of the measurement of the prior sample is instructed, the sample of the $(N+1)^{\text{th}}$ sample container 100 is transported to the first measurement unit 2 in Step S38. In Step S39, it is determined whether or not the measurement of the prior sample is instructed. When the measurement is instructed, N is changed to $(N+2)$ in Step S40. Then, the operation is transferred to Step S45. On the other hand, when the measurement is not instructed, it is determined whether or not $N=9$ in Step S41. When N is not equal to 9, N is changed to $(N+2)$ in Step S42. In Step S43, the sample of the N^{th} sample container 100 is transported to the second measurement unit 3. In Step S44, it is determined whether or not the measurement of the prior sample is instructed. When the measurement is not instructed, the operation is transferred to Step S38. When the measurement is instructed, it is determined whether or not the measurement of the prior sample is instructed on the first measurement unit 2 side in Step S46. When the measurement is instructed on the first measurement unit 2 side, the sample of $(N+1)^{\text{th}}$ sample container 100 is transported to the second measurement unit 3 in Step S47. In Step S48, it is determined whether or not the completion of the measurement of the prior sample is instructed. When the completion is not instructed, it is determined whether or not $N=9$ in Step S49. When $N=9$, the operation is transferred to Step S36. When N is not equal to 9, N is changed to $(N+2)$ in Step S50. Then, the operation is transferred to Step S30. In Step S48, when the completion is instructed, N is changed to $(N+2)$ in Step S51. In Step S46, when the measurement is not instructed on the first measurement unit 2 side, the operation is transferred to Step S54.

In Step S29, when the measurement of the prior sample is not instructed on the first measurement unit 2 side, the sample of the N^{th} sample container 100 is transported to the first measurement unit 2 in Step S52. In Step S53, it is determined whether or not the completion of the measurement of the prior sample is instructed. When the completion is instructed, the operation is transferred to Step S25. When the completion is not instructed, the sample of the $(N+1)^{\text{th}}$ sample container 100 is also transported to the first measurement unit 2 in Step S54. In Step S55, it is determined whether or not the completion of the measurement of the prior sample is instructed. When the completion is instructed, the operation is transferred to Step S42. When the completion is not instructed, it is determined whether or not $N=9$ in Step S56. When $N=9$, the operation is transferred to Step S36. When N is not equal to 9, N is changed to $(N+2)$ in Step S57. Then the operation is transferred to Step S52.

(Second Embodiment)

FIG. 19 is a perspective view illustrating an overall configuration of a blood analyzer according to a second embodiment of the invention. FIG. 20 is a flowchart for explaining the operation at the time of prior sample measurement of the

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blood analyzer according to the second embodiment shown in FIG. 19. Next, the operations at the time of prior sample measurement of the blood analyzer 600 according to the second embodiment will be described with reference to FIG. 10, FIG. 19, and FIG. 20. The blood analyzer 600 according to the second embodiment is configured to measure the prior sample only at any one of the first measurement unit 601 and the second measurement unit 602, unlike the blood analyzer 1 according to the first embodiment.

In Step S201 shown in FIG. 20, it is determined whether or not the display of the prior sample measurement instruction picture 520 (see FIG. 10) displayed on the display unit 52 (see FIG. 19) is instructed by a user, by the CPU 51a. The determination is repeated until the display is instructed. When the display is instructed, the prior sample measurement instruction picture 520 is displayed on the display unit 52 in Step S202. In Step S203, the user inputs a sample identification number or sets measurement items, and then it is determined whether or not the OK button 520a displayed on the prior sample measurement instruction picture 520 is pressed down by the CPU 51a. The determination is continued until the OK button 520a is pressed down.

In the second embodiment, when the OK button 520a is pressed down, it is determined whether or not the first measurement unit 601 can start the measurement of the prior sample prior to the second measurement unit 602 in the present state by the CPU 51a in Step S204. Specifically, the CPU 51a performs the determination on the basis of the state notification of the first measurement unit 601 and the second measurement unit 602 transmitted to the control unit 5, the event notification, and the like. When the first measurement unit 601 can start the measurement of the prior sample prior thereto, the sample set section 255a protrudes out of the insertion hole 24 in Step S205. Then, the user sets the sample container 100 accommodating the prior sample at the sample set section 255a in Step S206, and then it is determined whether or not the prior sample measurement start button 27 (see FIG. 19) is pressed down by the CPU 51a. When the prior sample measurement start button 27 is not pressed down, the determination is repeated. When the prior sample measurement start button 27 is pressed down, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 601 in Step S207. Accordingly, the prior sample is inserted into the first measurement unit 601.

In Step S208, the measurement of the prior sample is performed. In Step S209, it is determined whether or not the measurement is completed. The determination is repeated until the measurement is completed. When the measurement is completed, the sample set section 255a comes out of the insertion hole 24 in Step S210. Accordingly, the sample container 100 of the measured prior sample is discharged out of the first measurement unit 601 so as to be extracted. Then, in Step S211, it is determined whether or not the sample container 100 of the measured prior sample is removed from the sample set section 255a by CPU 51a. The determination is repeated until the sample container 100 is removed. When the sample container 100 is removed, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 601 in Step S212. In Step S213, the prior sample measurement instruction picture 520 is displayed on the display unit 52 again. In Step S214, the user inputs a sample identification number for a next new prior sample or sets measurement items, and then it is determined whether or not the OK button 520a displayed on the prior sample measurement instruction picture 520 is pressed down by the CPU 51a. When the OK button 520a is pressed down, the operation is transferred to Step S204. When the OK button 520a is not

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pressed down, it is determined whether or not the cancel button 520b displayed on the prior sample measurement instruction picture 520 is pressed down in Step S215 by the CPU 51a. In the second embodiment, the user may cancel the measurement of the prior sample by pressing down the cancel button 520b. In Step S215, when the cancel button 520b is not pressed down, the determinations are repeated until any one of the OK button 520a and the cancel button 520b is pressed down. When the cancel button 520b is pressed down, the operation of the measurement of the prior sample is completed as it is.

In the determination in Step S204, when the second measurement unit 602 can start the measurement of the prior sample prior thereto, the operation is transferred to Step S216. In this case, the operation of the measurement of the prior sample on the second measurement unit 602 side from Steps S216 to S226 is the same as the operation of the measurement on the first measurement unit 601 side described in Steps S205 to S215. Accordingly, the description of the operation of the measurement of the prior sample on the second measurement unit 602 side is omitted.

As described above, in the second embodiment, the CPU 51a determines to measure the prior sample using which one of the first measurement unit 601 and the second measurement unit 602. Accordingly, the user need not to select any one of the measurement units to measure the prior sample. For this reason, as shown in FIG. 19, the first measurement unit 601 and the second measurement unit 602 of the blood analyzer 600 according to the second embodiment are not provided with the sample set section open and close button.

The other structure of the blood analyzer 600 according to the second embodiment is the same as that of the first embodiment.

In the second embodiment, as described above, when the measurement of the prior sample is instructed from the prior sample measurement instruction picture 520, the CPU 51a is configured to select any one measurement unit capable of more promptly measuring the prior sample from the first measurement unit 601 and the second measurement unit 602. Accordingly, it is possible to measure the prior sample on the measurement unit capable of more promptly measuring the prior sample selected by the CPU 51a, from the first measurement unit 601 and the second measurement unit 602. Therefore, it is possible to promptly perform the process of the prior sample.

In the second embodiment, the CPU 51a selects any one capable of more promptly measuring the prior sample from the first measurement unit 601 and the second measurement unit 602, and only the sample set section of the selected side comes out. Accordingly, it is possible to prevent the user from wandering that the sample container 100 of the prior sample is to be set at which sample set section of the first measurement unit 601 and the second measurement unit 602.

(Third Embodiment)

FIG. 21 is a perspective view illustrating an overall configuration of a blood analyzer according to a third embodiment of the invention. FIG. 22 is a flowchart for explaining the operation at the time of prior sample measurement of the blood analyzer according to the third embodiment shown in FIG. 21. Next, the operation at the time of the prior sample measurement of the blood analyzer 700 according to the third embodiment will be described with reference to FIG. 10, FIG. 21, and FIG. 22. The blood analyzer 700 according to the third embodiment is configured to continuously measure a next new prior sample, without an instruction of measurement

from the prior sample measurement instruction picture 520 for each sample, unlike the blood analyzer 600 according to the second embodiment.

First, in Step S301 shown in FIG. 22, it is determined whether or not the display of the prior sample measurement instruction picture 520 (see FIG. 10) displayed on the display unit 52 (see FIG. 21) is instructed by a user, by the CPU 51a. The determination is repeated until the display is instructed. When the display is instructed, the prior sample measurement instruction picture 520 is displayed on the display unit 52 in Step S302. In Step S303, the user inputs a sample identification number or sets measurement items, and then it is determined whether or not the OK button 520a displayed on the prior sample measurement instruction picture 520 is pressed down by the CPU 51a. The determination is continued until the OK button 520a is pressed down.

In the third embodiment, when the OK button 520a is pressed down, it is determined whether or not the first measurement unit 701 can start the measurement of the prior sample prior to the second measurement unit 702 in the present state by the CPU 51a in Step S304. Specifically, the CPU 51a performs the determination on the basis of the state notification of the first measurement unit 701 and the second measurement unit 702 transmitted to the control unit 5, the event notification, and the like. When the first measurement unit 701 can start the measurement of the prior sample prior thereto, the sample set section 255a protrudes out of the insertion hole 24 in Step S305. Then, the user sets the sample container 100 accommodating the prior sample at the sample set section 255a in Step S306, and then it is determined whether or not the prior sample measurement start button 27 (see FIG. 21) is pressed down by the CPU 51a. When the prior sample measurement start button 27 is not pressed down, the determination is repeated. When the prior sample measurement start button 27 is pressed down, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 701 in Step S307. Accordingly, the prior sample is inserted into the first measurement unit 701.

In Step S308, the measurement of the prior sample is performed. In Step S309, it is determined whether or not the measurement is completed. The determination is repeated until the measurement is completed. When the measurement is completed, the sample set section 255a comes out of the insertion hole 24 in Step S310. Accordingly, the sample container 100 of the measured prior sample is discharged out of the first measurement unit 701 so as to be extracted. Then, in Step S311, it is determined whether or not the prior sample measurement start button 27 is pressed down.

In the third embodiment, the user removes the sample container 100 of the measured prior sample from the sample set section 255a, and then sets the sample container 100 accommodating a next new prior sample at the sample set section 255a. The prior sample measurement start button 27 is pressed down, thereby continuously performing the measurement of the prior sample. When the user sets the sample container 100 accommodating the next new prior sample at the sample set section 255a and presses down the prior sample measurement start button 27, the operation is transferred to Step S307 and the measurement of the next prior sample is continuously performed. In this case, even when the user does not input the sample identification number or set the measurement items, continuous identification numbers are automatically assigned by the CPU 51a and the measurement is continued with the same items as the once set measurement items.

When the prior sample measurement start button 27 is not pressed down, it is determined whether or not the sample set section close button 701a (see FIG. 21) is pressed down by the CPU 51a in Step S312. The user may cancel the measurement of the prior sample by pressing down the sample set section close button 701a. When the sample set section close button 701a is not pressed down, the determination is repeated until any one of the prior sample measurement start button 27 and the sample set section close button 701a is pressed down. When the sample set section close button 701a is pressed down, the sample set section 255a is returned from the insertion hole 24 to the inside of the first measurement unit 701 in Step S313 and the measurement operation of the prior sample is completed.

In the determination in Step S304, when the second measurement unit 702 can start the measurement of the prior sample prior thereto, the operation is transferred to Step S314. In this case, the operation of the measurement of the prior sample on the second measurement unit 702 side from Steps S314 to S322 is the same as the operation of the measurement on the first measurement unit 701 side described in Steps S305 to S313. Accordingly, the description of the operation of the measurement of the prior sample on the second measurement unit 702 side is omitted.

The other structure of the blood analyzer 700 according to the third embodiment is the same as that of the second embodiment.

In the third embodiment, as described above, only the sample set section of one measurement unit selected by the CPU 51a comes out. Accordingly, it is possible to prevent the user from wandering that the sample container 100 of the prior sample is to be set at which sample set section of the first measurement unit 701 and the second measurement unit 702.

In the third embodiment, the user removes the sample container 100 of the measured prior sample from the sample set section 255a and then sets the sample container 100 accommodating the next new prior sample at the sample set section 255a. Accordingly, it is possible to continuously perform the measurement of the prior sample by pressing down the prior sample measurement start button 27. Therefore, it is possible to reduce burden of the user at the time of measuring the prior sample.

The other advantage of the third embodiment is the same as that of the second embodiment.

All the above-described embodiments are only examples, and it should be considered that they are not restrictive examples. The scope of the invention is not limited to the description of the embodiments, but is limited only by Claims. In addition, the scope of the invention includes all modifications within the means and scope equivalent to Claims.

For example, in the first to third embodiments, the blood analyzer has been described as an example of an analyzer, but the invention is not limited thereto. The invention may be applied to the other analyzer as long as it is an analyzer provided with a plurality of measurement units.

In the first to third embodiment, the blood analyzer is provided with two measurement unit of the first measurement unit and the second measurement unit by way of example, but the invention is not limited thereto. The blood analyzer may be provided with three or more measurement units.

In the first to third embodiments, when the measurement of the prior sample is not instructed, the sample transportation device alternately transports the samples to the first measurement unit and the second measurement unit by way of example, but the invention is not limited thereto. The sample transportation device may transport the samples to the mea-

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surement unit capable of more promptly starting the measurement of the samples at the time of the transportation of the samples between the first measurement unit and the second measurement unit. Accordingly, the blood analyzer can promptly process the samples, even when process performances of the first measurement unit and the second measurement unit are different from each other.

In the first to third embodiment, the control device is provided with one control unit by way of example, but the invention is not limited thereto. The first measurement unit and the second measurement unit may be provided with different control units, respectively. These control units may be mounted on the first measurement unit and the second measurement units, respectively.

In the first to third embodiment, the first measurement unit and the second measurement unit are accommodated in the independent different housings, respectively, by way of example (see FIG. 1, FIG. 2, FIG. 19 and FIG. 21), but the invention is not limited thereto. As shown in FIG. 23, the first measurement unit and the second measurement unit may be accommodated together in one housing 7.

In the first to third embodiment, the first measurement unit and the second measurement unit are substantially the same type of measurement units by way of example, but the invention is not limited thereto. The first measurement unit and the second measurement unit may be different kinds of measurement units.

What is claimed is:

1. An analyzer comprising:
 - a first measurement unit for measuring samples;
 - a second measurement unit for measuring samples;
 - a transportation device for transporting rack holding sample containers each of which contains a sample between the first measurement unit and the second measurement unit by transporting the rack in a first direction from the first measurement unit to the second measurement unit and in a second direction which is an opposite direction of the first direction;
 - a prior sample measurement instructor configured to provide measurement instructions for a measurement of one or more predetermined samples by the first measurement unit or by the second measurement unit; and
 - a transportation controller programmed to perform operations comprising:
 - controlling the transportation device to transport a rack holding a plurality of sample containers in the first and second directions so as to distribute the plurality of sample containers among the first measurement unit and the second measurement unit the prior sample measurement instructor instructs the measurement of the predetermined samples; and
 - controlling the transportation device, in response to an instruction to measure one or more of the predetermined samples by the second measurement unit, to transport the rack holding the plurality of sample containers so as to locate each of the plurality of sample containers at a predetermined position which is different from a position for providing the second measurement unit with a sample container.
2. The analyzer according to claim 1, wherein the predetermined position comprises at least one of:
 - a position for providing the first measurement unit with a sample container for containing a sample;
 - a sample presence check position where whether or not there is a sample container for containing a sample is checked; and

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a reading position where an identifier attached to a sample container for containing a sample is read.

3. The analyzer according to claim 1, wherein the prior sample measurement instructor is configured to instruct the first measurement unit to measure the predetermined sample,

the first measurement unit comprises a first sample set section configured to receive the predetermined sample in response to an instruction to measure the predetermined sample by the first measurement unit,

wherein the second measurement unit comprises a second sample set section configured to receive the predetermined sample in response to an instruction to measure the predetermined sample by the second measurement unit.

4. The analyzer according to claim 3, wherein the first sample set section is configured to protrude out of the first measurement unit, and

wherein the second sample set section is configured to protrude out of the second measurement unit.

5. The analyzer according to claim 1, wherein the transportation controller is programmed to control the transportation device to transport the rack holding the plurality of sample containers in the first and second directions so as to alternatively distribute the plurality of sample containers among the first measurement unit and the second measurement unit the prior sample measurement instructor instructs the measurement of the predetermined sample.

6. The analyzer according to claim 3, wherein the prior sample measurement instructor comprises a measurement instruction button provide the measurement instructions for measurement of the predetermined sample provided for each of the first measurement unit and the second measurement unit.

7. The analyzer according to claim 3, further comprising a display for displaying a measurement instruction button that is configured to provide an instruction for measurement of the predetermined sample in response to activation of the measurement instruction button by a user.

8. The analyzer according to claim 7, wherein in response to an instruction for measurement of the predetermined sample provided by the measurement instruction button, the transportation controller is programmed to select a measurement unit capable of more promptly measuring the predetermined sample from the first measurement unit and the second measurement unit.

9. The analyzer according to claim 1, wherein a first measurement unit for measuring samples on first measurement items,

a second measurement unit for measuring samples on second measurement items, and

at least one of the first measurement items of the first measurement unit and at least one of the second measurement items of the second measurement unit are common.

10. The analyzer according to claim 1, wherein the first measurement unit and the second measurement unit are each configured to measure blood cells included in samples.

11. An analyzer comprising:

a first measurement unit for measuring samples;

a second measurement unit for measuring samples;

a transportation device for transporting a rack holding sample containers each of which contains a sample between the first measurement unit and, the second measurement unit by transporting the rack in a first direction from the first measuring unit to the second measurement

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unit and in a second direction from the second measurement unit to the first measuring unit;

a prior sample measurement instructor configured to provide measurement instructions for a measurement of a predetermined sample by the first measurement unit or by the second measurement unit;

a transportation controller configured to perform operations comprising:

controlling the transportation device to transport at least one sample container among the sample containers to the first measurement unit by transporting the rack in the first direction and at least another sample container among the sample containers to the second measurement unit by transporting the rack in the second direction until the prior sample measurement instructor instructs the measurement of the predetermined sample; and

controlling the transportation device, in response to an instruction to measure the predetermined sample by the second measurement unit, to stop a transportation of the rack to the second measurement unit and to transport the rack to the first measurement unit for measuring the samples in the sample containers by the first measurement unit; and

a display for displaying a measurement instruction button, wherein the prior sample measurement instructor comprises an input device through which the measurement instruction button is operated by a user to instruct the measurement of the predetermined sample.

12. The analyzer according to claim **11**, wherein the first measurement unit comprises a first sample set section configured to protrude out of the first measurement unit for receiving the predetermined sample, and the second measurement unit comprises a second sample set section configured to protrude out of the second measurement unit for receiving the predetermined sample.

13. The analyzer according to claim **12**, wherein the first sample set section protrudes out of the first measurement unit when the prior sample measurement instructor has been instructed to measure the predetermined sample by the first measurement unit, and the second sample set section protrudes out of the second measurement unit when the prior sample measurement instructor has been instructed to measure the predetermined sample by the second measurement unit.

14. An analyzer comprising:

a first measurement unit for measuring samples;

a second measurement unit for measuring samples;

a transportation device for transporting a rack holding sample containers each of which contains a sample between the first measurement unit and the second measurement unit by transporting the rack in a first direction from the first measuring unit to the second measurement unit and in a second direction from the second measurement unit to the first measuring unit;

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a first instructor configured to provide a measurement instruction to the first measurement unit to measure a predetermined sample;

a second instructor configured to provide a measurement instruction to the second measurement unit to measure a predetermined sample; and

a transportation controller configured to perform operations comprising:

controlling the transportation device to transport at least one sample container among the sample containers to the first measurement unit by transporting the rack in the first direction and at least another sample container among the sample containers to the second measurement unit by transporting the rack in the second direction until at least one of the first instructor and the second instructor instruct a measurement of the predetermined sample;

controlling the transportation device, in response to an instruction to measure the predetermined sample by the first measurement unit, to stop a transportation of the rack to the first measurement unit and to transport the rack to the second measurement unit for measuring the samples in the sample containers by the second measurement unit,

controlling the transportation device, in response to an instruction to measure the predetermined sample by the second measurement unit, to stop a transportation of the rack to the second measurement unit and to transport the rack to the first measurement unit for measuring the samples in the sample containers by the first measurement unit.

15. The analyzer according to claim **14**, wherein the first measurement unit comprises a first sample set section configured to protrude out of the first measurement unit for receiving the predetermined sample, and the second measurement unit comprises a second sample set section configured to protrude out of the second measurement unit for receiving the predetermined sample.

16. The analyzer according to claim **15**, wherein the first sample set section protrudes out of the first measurement unit when the first instructor has been instructed to measure the predetermined sample by the first measurement unit, and the second sample set section protrudes out of the second measurement unit when the second instructor has been instructed to measure the predetermined sample by the second measurement unit.

17. The analyzer according to claim **14**, wherein the first instructor comprises a first instruction button for instructing a measurement of the predetermined sample provided for the first measurement unit, and the second instructor comprises a second instruction button for instructing a measurement of the predetermined sample provided for the second measurement unit.

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